Appendix Q

Summary of Statistical Analysis

Table 1

UPPER WILLOW BROOK POND SAMPLING - SUMMARY OF SAMPLING AND ANALYTICAL INFORMATION

REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

Sample Information					Analysis Information							
Location ID	Sample ID	Sample Date	Sampled Interval (ft)	Sample Class	LEAVolatiles	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Miscellaneous Analyses
WT-CS-02-034	2001368	11/28/2001		SS		x	x			x	X	x
WT-CS-02-038	2001373	11/28/2001		SS		x	x			x	X	x
WT-CS-02-040	2001375	11/28/2001		SS		x	x			x	X	x
WT-CS-02-042	2001377	11/28/2001		SS		x	X			x	X	x
WT-CS-02-042	2001378	11/28/2001		SS		x	X			x	X	x
WT-CS-02-054	2001392	11/29/2001		SS		x	X			X	X	x
WT-CS-02-054	2001393	11/29/2001		SS		x	X			x	X	x
WT-CS-02-064	2001669	01/10/2002		SS			Xs			X		
WT-CS-03-020	2001323	11/27/2001		SS		x	x			X	X	x
WT-CS-03-024	2001327	11/27/2001		SS		x	x			X	X	x
WT-CS-03-026	2001329	11/27/2001		SS		x	x			x	X	x
WT-CS-03-028	2001338	11/27/2001		SS		x	x			x	X	x
WT-CS-03-030	2001340	11/27/2001		SS		x	x			x	X	x
WT-CS-03-032	2001343	11/27/2001		SS		x	x			x	X	x
WT-CS-03-034	2001345	11/27/2001		SS		x	x			x	X	x
WT-CS-03-034	2001356	11/27/2001		SS		x	x			x	X	x
WT-CS-03-038	2001362	11/29/2001		SS		x	x			X	X	x
WT-CS-03-040	2001364	11/29/2001		SS		x	X			x	X	X
WT-CS-03-042	2001366	11/29/2001		SS		X z	X			x	X	X
WT-CS-03-043	2001401	11/30/2001		SS			X				XS	
WT-CS-03-045	2001435	12/04/2001		SS		x	X			x	X	X
WT-CS-03-047	2001437	12/04/2001		SS		x	x			x	X	x
WT-CS-03-048	2001438	12/04/2001		SS		x	x			x	X	x

Legend: x - mass, t - TCLP, s - SPLP, e - EPTOX, z - ZHE, d - Thermal Desorption, r - Charcoal Tube, a - SEM/AVS, f - filtered, nr - not received; Capitalized - at least one analyte in class detected

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Table 2
UPPER WILLOW BROOK POND SAMPLING - SUMMARY OF ANALYTICAL RESULTS (DETECTS)
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-02-042	WT-CS-02-042	WT-CS-02-054	WT-CS-02-054	WT-CS-02-064	WT-CS-03-020	WT-CS-03-024
	Sample ID	2001377	2001378	2001392	2001393	2001669	2001323	2001327
	Sample Date	11/28/2001	11/28/2001	11/29/2001	11/29/2001	01/10/2002	11/27/2001	11/27/2001
	Sample Time	12:28	12:30	10:05	10:10	12:50	13:05	13:25
	Laboratory	PREM	PREM	PREM	PREM	PREM	PREM	PREM
	Lab. Number	E111B35-11A	E111B35-12A	E111C63-3A	E111C63-4A	E201358-5	E111A64-2A	E111A64-6A
Constituent	Units							
Date PCBs Analyzed	-			12/03/2001		01/10/2002	11/27/2001	11/27/2001
Date Semi-volatile Organics Analyzed	-	11/30/2001	11/30/2001		12/03/2001	01/14/2002		
PCB 1242	ug/kg			380 J				
PCB 1254	ug/kg					1400	270	310
Benz[a]anthracene	ug/kg	1100 J	2500 J		380 J	1000		
Benz[e]acephenanthrylene	ug/kg	1500 J	3100 J		230	1000		
Benzo[a]pyrene	ug/kg	1300 J	2400 J		290	1000		
Benzo[k]fluoranthene	ug/kg	1200	1200		290	950		
Chrysene	ug/kg	1500 J	2700 J		350	1100		

Table 2
UPPER WILLOW BROOK POND SAMPLING - SUMMARY OF ANALYTICAL RESULTS (DETECTS)
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-03-038	WT-CS-03-040	WT-CS-03-042	WT-CS-03-043	WT-CS-03-045		
	Sample ID	2001362	2001364	2001366	2001401	2001435		
	Sample Date	11/29/2001	11/29/2001	11/29/2001	11/30/2001	12/04/2001		
	Sample Time	09:45	09:52	11:05	10:50	09:55		
	Laboratory	PREM	PREM	PREM	PREM	PREM		
	Lab. Number	E111C12-4A	E111C12-6A	E111C12-8A	E111C58-1A	E112079-2A		
Constituent	Units							
Date PCBs Analyzed	-	11/30/2001						
Date Semi-volatile Organics Analyzed	-		11/30/2001	12/04/2001	12/04/2001	12/06/2001		
PCB 1242	ug/kg							
PCB 1254	ug/kg	280						
Benz[a]anthracene	ug/kg		390	260	520	680		
Benz[e]acephenanthrylene	ug/kg		690	300 J	1000 J	980 J		
Benzo[a]pyrene	ug/kg		430	300 J	620 J	640		
Benzo[k]fluoranthene	ug/kg		240	300 J	320 J	340		
Chrysene	ug/kg		460	400 J	740	750		

SUMMARY OF STATISTICS ON ANALYTES
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

PCB 1260		PCB	*Non-parametric statistics*			α =	0.9500
Units ug/kg	0 Detects	22 non-detects		Maximum found	0.0000	β =	0.8000
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)	-1.0000		
PCB 1254		PCB	*Aitchison's Adujstment preferred, log transformed values*			α =	0.9500
Units ug/kg	4 Detects	18 non-detects		Maximum found	1400.0000	β =	0.0500
Preferred Average	77.3820	Preferred Standard Deviation	168.0171	Upper Confidence Limit on the Mean (p = .95)	20195270760 80.9004		
PCB 1221		PCB	*Non-parametric statistics*			α =	0.9500
Units ug/kg	0 Detects	22 non-detects		Maximum found	0.0000	β =	0.8000
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)	-1.0000		
PCB 1232		PCB	*Non-parametric statistics*			α =	0.9500
Units ug/kg	0 Detects	22 non-detects		Maximum found	0.0000	β =	0.8000
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)	-1.0000		
PCB 1248		PCB	*Non-parametric statistics*			α =	0.9500
Units ug/kg	0 Detects	22 non-detects		Maximum found	0.0000	β =	0.8000
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)	-1.0000		
PCB 1016		PCB	*Non-parametric statistics*			α =	0.9500
Units ug/kg	0 Detects	22 non-detects		Maximum found	0.0000	β =	0.8000
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)	-1.0000		
PCB 1242		PCB	*Non-parametric statistics*			α =	0.9500
Units ug/kg	1 Detects	21 non-detects		Maximum found	380.0000	β =	0.8000
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)	-1.0000		
Benz[e]acephenanthrylene		SVOL	*Aitchison's Adujstment preferred, log transformed values*			α =	0.9500
Units ug/kg	8 Detects	15 non-detects		Maximum found	3100.0000	β =	0.0500
Preferred Average	287.3487	Preferred Standard Deviation	402.3137	Upper Confidence Limit on the Mean (p = .95)	31500112791 562708.0000		
Benzo[k]fluoranthene		SVOL	*Aitchison's Adujstment preferred, log transformed values*			α =	0.9500
Units ug/kg	8 Detects	15 non-detects		Maximum found	1200.0000	β =	0.0500
Preferred Average	169.0121	Preferred Standard Deviation	236.6334	Upper Confidence Limit on the Mean (p = .95)	79932871548 412.1094		
Chrysene		SVOL	*Aitchison's Adujstment preferred, log transformed values*			α =	0.9500
Units ug/kg	8 Detects	15 non-detects		Maximum found	2700.0000	β =	0.0500
Preferred Average	276.4493	Preferred Standard Deviation	387.0531	Upper Confidence Limit on the Mean (p = .95)	20036697542 090720.0000		
Benzo[a]pyrene		SVOL	*Aitchison's Adujstment preferred, log transformed values*			α =	0.9500
Units ug/kg	8 Detects	15 non-detects		Maximum found	2400.0000	β =	0.0500
Preferred Average	236.9062	Preferred Standard Deviation	331.6900	Upper Confidence Limit on the Mean (p = .95)	33809010117		

SUMMARY OF STATISTICS ON ANALYTES
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

					93662.0000		
Benz[a]anthracene		SVOL	*Aitchison's Adjustment preferred, log transformed values*			α =	0.9500
Units ug/kg	8 Detects	15 non-detects		Maximum found	2500.0000	β =	0.0500
Preferred Average	230.7121	Preferred Standard Deviation	323.0178	Upper Confidence Limit on the Mean (p = .95)	25017932951		
					26222.5000		
Benz[e]acephenanthrylene (SPLP)		SVOL S	*Insufficient data*			α =	0.9500
Units ug/l	0 Detects	1 non-detects		Maximum found	0.0000	β =	
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)			
Benzo[k]fluoranthene (SPLP)		SVOL S	*Insufficient data*			α =	0.9500
Units ug/l	0 Detects	1 non-detects		Maximum found	0.0000	β =	
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)			
Chrysene (SPLP)		SVOL S	*Insufficient data*			α =	0.9500
Units ug/l	0 Detects	1 non-detects		Maximum found	0.0000	β =	
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)			
Benzo[a]pyrene (SPLP)		SVOL S	*Insufficient data*			α =	0.9500
Units ug/l	0 Detects	1 non-detects		Maximum found	0.0000	β =	
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)			
Benz[a]anthracene (SPLP)		SVOL S	*Insufficient data*			α =	0.9500
Units ug/l	0 Detects	1 non-detects		Maximum found	0.0000	β =	
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)			

Table 1
WETLAND SAMPLING - SUMMARY OF SAMPLING AND ANALYTICAL INFORMATION
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

Sample Information					Analysis Information							
Location ID	Sample ID	Sample Date	Sampled Interval (ft)	Sample Class	LEA Volatiles	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Miscellaneous Analyses
WT-CS-12-018	2001779	01/25/2002		SS		x	x			x	X	x
WT-CS-12-034	2001869	02/13/2002		SS		x	x			x	X	x
WT-CS-12-036	2001871	02/13/2002		SS		x	x			x	X	x
WT-CS-12-038	2001873	02/13/2002		SS		x	x			x	X	x
WT-CS-12-046	2001882	02/14/2002		SS		x	x			x	X	x
WT-CS-12-048	2001885	02/14/2002		SS		x	x			x	X	x
WT-CS-12-049	2001886	02/14/2002		SS								x
WT-CS-12-050	2001887	02/14/2002		SS								x
WT-CS-12-056	2001900	02/15/2002		SS		x	x			x	X	x
WT-CS-12-057	2001901	02/15/2002		SS								x
WT-CS-12-058	2001902	02/15/2002		SS								x
WT-CS-12-064	2001910	02/19/2002		SS		x	x			x	X	x
WT-CS-12-066	2001912	02/19/2002		SS		x	x			x	X	x
WT-CS-12-072	2001918	02/19/2002		SS		x	x			x	X	x
WT-CS-12-074	2001920	02/19/2002		SS								x
WT-CS-12-075	2001921	02/19/2002		SS			Xs					x
WT-CS-12-076	2001922	02/19/2002		SS						x		
WT-CS-12-080	2001934	02/20/2002		SS		x	x			x	X	x
WT-CS-12-090	2001955	02/26/2002		SS		x	x			x	X	x
WT-CS-12-092	2001964	02/28/2002		SS		x	x			x	X	X
WT-CS-12-094	2001966	02/28/2002		SS		x	x			x	X	X
WT-CS-12-096	2001968	02/28/2002		SS		x	X			X	X	X
WT-CS-12-096	2001970	03/12/2002		SS			s					
WT-CS-12-098	2001972	03/12/2002		SS		x	x			x	X	X
WT-CS-12-100	2001974	03/12/2002		SS		x	x			x	X	X

Legend: x - mass, t - TCLP, s - SPLP, e - EPTOX, z - ZHE, d - Thermal Desorption, r - Charcoal Tube, a - SEM/AVS, f - filtered, nr - not received; Capitalized - at least one analyte in class detected

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Table 2
WETLAND SAMPLING - SUMMARY OF ANALYTICAL RESULTS (DETECTS)
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-12-075	WT-CS-12-092	WT-CS-12-094	WT-CS-12-096	WT-CS-12-098	WT-CS-12-100	
	Sample ID	2001921	2001964	2001966	2001968	2001972	2001974	
	Sample Date	02/19/2002	02/28/2002	02/28/2002	02/28/2002	03/12/2002	03/12/2002	
	Sample Time	12:10	11:50	12:05	12:45	10:35	10:45	
	Laboratory	PREM	PREM	PREM	PREM	PREM	PREM	
	Lab. Number	E202647-17	E202A54-2A	E202A54-4A	E202A54-6A	E203433-3A	E203433-5A	
Constituent	Units							
Date Physical Analyzed	-		03/01/2002	03/01/2002	03/01/2002	03/14/2002	03/14/2002	
Date Semi-volatile Organics Analyzed	-	02/22/2002			03/01/2002			
Petroleum Hydrocarbons EPA 418.1, Total	mg/kg		400	260	640	390	240	
Benz[e]acephenanthrylene	ug/kg	1100			1100			
Benzo[a]pyrene	ug/kg	1100			1200			
Benzo[k]fluoranthene	ug/kg	1300			1200			
Chrysene	ug/kg	1300			1400			

SUMMARY OF STATISTICS ON ANALYTES
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

Petroleum Hydrocarbons EPA 418.1, Total		PHYSC	*Aitchison's Adjustment preferred, log transformed values*			α =	0.9500
Units mg/kg	5 Detects	18 non-detects		Maximum found	640.0000	β =	0.0500
Preferred Average	78.7300	Preferred Standard Deviation	152.7382	Upper Confidence Limit on the Mean (p = .95)	60823250324 1.3951		
Benz[e]acephenanthrylene		SVOL	*Non-parametric statistics*			α =	0.9500
Units ug/kg	2 Detects	16 non-detects		Maximum found	1100.0000	β =	0.7600
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)	-1.0000		
Benzo[k]fluoranthene		SVOL	*Non-parametric statistics*			α =	0.9500
Units ug/kg	2 Detects	16 non-detects		Maximum found	1300.0000	β =	0.7600
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)	-1.0000		
Chrysene		SVOL	*Non-parametric statistics*			α =	0.9500
Units ug/kg	2 Detects	16 non-detects		Maximum found	1400.0000	β =	0.7600
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)	-1.0000		
Benzo[a]pyrene		SVOL	*Non-parametric statistics*			α =	0.9500
Units ug/kg	2 Detects	16 non-detects		Maximum found	1200.0000	β =	0.7600
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)	-1.0000		
Benz[e]acephenanthrylene (SPLP)		SVOL S	*Non-parametric statistics*			α =	0.9500
Units ug/l	0 Detects	2 non-detects		Maximum found	0.0000	β =	0.2200
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)	-1.0000		
Benzo[k]fluoranthene (SPLP)		SVOL S	*Non-parametric statistics*			α =	0.9500
Units ug/l	0 Detects	2 non-detects		Maximum found	0.0000	β =	0.2200
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)	-1.0000		
Chrysene (SPLP)		SVOL S	*Non-parametric statistics*			α =	0.9500
Units ug/l	0 Detects	2 non-detects		Maximum found	0.0000	β =	0.2200
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)	-1.0000		
Benzo[a]pyrene (SPLP)		SVOL S	*Non-parametric statistics*			α =	0.9500
Units ug/l	0 Detects	2 non-detects		Maximum found	0.0000	β =	0.2200
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)	-1.0000		

Table 1
LOWER WILLOW BROOK POND - SUMMARY OF SAMPLING AND ANALYTICAL INFORMATION
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

Sample Information					Analysis Information							
Location ID	Sample ID	Sample Date	Sampled Interval (ft)	Sample Class	LEA Volatiles	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Miscellaneous Analyses
WT-CS-06-011	2001518	12/17/2001		SS		x	x			X	Xs	X
WT-CS-06-013	2001520	12/17/2001		SS		x	x			X	Xs	x
WT-CS-06-025	2001533	12/21/2001		SS		x	x			X	X	x
WT-CS-06-028	2001536	12/21/2001		SS		x	x			x	X	x
WT-CS-06-030	2001538	12/21/2001		SS		x	x			X	X	x
WT-CS-08-009	2001605	01/04/2002		SS		x	x			x	X	x
WT-CS-08-009	2001606	01/04/2002		SS		x	x			X	X	x
WT-CS-08-011	2001608	01/04/2002		SS		x	x			x	X	x
WT-CS-08-023	2001642	01/09/2002		SS		x	x			x	X	x
WT-CS-08-025	2001644	01/09/2002		SS		x	X			X	X	X
WT-CS-08-025	2001645	01/09/2002		SS		x	X			X	X	X
WT-CS-08-033	2001719	01/18/2002		SS						x		x
WT-CS-11-005	2001620	01/07/2002		SS		x	x			x	X	x
WT-CS-11-007	2001622	01/07/2002		SS		x	x			x	X	x
WT-CS-11-020	2001661	01/09/2002		SS		x	x			x	X	x
WT-CS-11-022	2001663	01/09/2002		SS		x	x			X	X	x
WT-CS-11-042	2001703	01/16/2002		SS		x	x			x	X	x
WT-CS-11-049	2001722	01/18/2002		SS		x	X			x	X	X
WT-CS-11-051	2001724	01/18/2002		SS		x	X			X	X	X

Legend: x - mass, t - TCLP, s - SPLP, e - EPTOX, z - ZHE, d - Thermal Desorption, r - Charcoal Tube, a - SEM/AVS, f - filtered, nr - not received; Capitalized - at least one analyte in class detected

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Table 2
LOWER WILLOW BROOK POND - SUMMARY OF ANALYTICAL RESULTS (DETECTS)
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-06-011	WT-CS-08-025	WT-CS-08-025	WT-CS-11-049	WT-CS-11-051		
	Sample ID	2001518	2001644	2001645	2001722	2001724		
	Sample Date	12/17/2001	01/09/2002	01/09/2002	01/18/2002	01/18/2002		
	Sample Time	12:05	09:20	09:23	12:05	12:13		
	Laboratory	PREM	PREM	PREM	PREM	PREM		
	Lab. Number	E112639-8A	E201296-7A	E201296-8A	E201691-4A	E201691-6A		
Constituent	Units							
Date Physical Analyzed	-	12/18/2001	01/10/2002	01/10/2002	01/21/2002	01/21/2002		
Petroleum Hydrocarbons EPA 418.1, Total	mg/kg	140	470 J	1000 J	110	690		

SUMMARY OF STATISTICS ON ANALYTES
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

Petroleum Hydrocarbons EPA 418.1, Total PHYSC *Aitchison's Adjustment preferred, normal values* α = 0.9500
Units mg/kg 5 Detects 14 non-detects Maximum found 1000.0000 β = 0.0500
Preferred Average 126.8421 Preferred Standard Deviation 281.1692 Upper Confidence Limit on the Mean (p = .95) 262.3664

Table 1
OIL/WATER SEPARATOR SAMPLING - SUMMARY OF SAMPLING AND ANALYTICAL INFORMATION
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

Sample Information					Analysis Information							
Location ID	Sample ID	Sample Date	Sampled Interval (ft)	Sample Class	LEAVolatiles	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Miscellaneous Analyses
WT-CS-03-028	2001338	11/27/2001		SS		x	x			x	X	x
WT-CS-03-047	2001437	12/04/2001		SS		x	x			x	X	x
WT-CS-04-065	2001410	12/03/2001		SS		x	X			x	Xs	x
WT-CS-04-069	2001414	12/03/2001		SS		x	x			x	Xs	x
WT-CS-04-069	2001415	12/03/2001		SS		x	x			x	Xs	x
WT-CS-04-071	2001417	12/03/2001		SS		x	x			X	Xs	x
WT-CS-04-073	2001420	12/03/2001		SS		x	x			x	Xs	x
WT-CS-04-080	2001441	12/05/2001		SS		x	x			X	XS	X
WT-CS-04-083	2001444	12/05/2001		SS		x	x			X	Xs	x
WT-CS-04-083	2001445	12/05/2001		SS		x	x			X	XS	x
WT-CS-04-085	2001447	12/05/2001		SS		x	x			X	Xs	x
WT-CS-04-087	2001450	12/05/2001		SS		x	x			x	Xs	x
WT-CS-04-089	2001452	12/05/2001		SS		x	x			x	XS	x
WT-CS-04-097	2001467	12/07/2001		SS		x	x			x	Xs	x
WT-CS-04-099	2001469	12/07/2001		SS		x	X			x	Xs	x
WT-CS-04-101	2001471	12/07/2001		SS		x	x			x	Xs	x
WT-CS-04-103	2001473	12/07/2001		SS		x	x			x	Xs	x
WT-CS-04-107	2001484	12/12/2001		SS		x	x			x	X	x
WT-CS-04-109	2001486	12/12/2001		SS		x	x			x	X	x
WT-CS-04-113	2001507	12/17/2001		SS		x	x			x	X	X
WT-CS-04-115	2001509	12/17/2001		SS		x	x			x	X	x

Legend: x - mass, t - TCLP, s - SPLP, e - EPTOX, z - ZHE, d - Thermal Desorption, r - Charcoal Tube, a - SEM/AVS, f - filtered, nr - not received; Capitalized - at least one analyte in class detected

Printed on 09/24/2002

Table 2
OIL/WATER SEPARATOR SAMPLING - SUMMARY OF ANALYTICAL RESULTS (DETECTS)
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-04-080	WT-CS-04-113					
	Sample ID	2001441	2001507					
	Sample Date	12/05/2001	12/17/2001					
	Sample Time	09:45	08:45					
	Laboratory	PREM	PREM					
	Lab. Number	E112129-1A	E112646-4A					
Constituent	Units							
Date Physical Analyzed	-	12/06/2001	12/18/2001					
Petroleum Hydrocarbons EPA 418.1, Total	mg/kg	640	570					

SUMMARY OF STATISTICS ON ANALYTES
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

Petroleum Hydrocarbons EPA 418.1, Total		PHYSC	*Non-parametric statistics*			α =	0.9500
Units mg/kg	2 Detects	19 non-detects		Maximum found	640.0000	β =	0.7900
Preferred Average	-1.0000	Preferred Standard Deviation	-1.0000	Upper Confidence Limit on the Mean (p = .95)	-1.0000		

Appendix R

Summary of SPLP Analysis for SVOCs

Table 1
SPLP AND MASS FOR SVOCS - SUMMARY OF SAMPLING AND ANALYTICAL INFORMATION
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

Sample Information					Analysis Information							
Location ID	Sample ID	Sample Date	Sampled Interval (ft)	Sample Class	LEA Volatiles	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Miscellaneous Analyses
WT-CS-02-050	2001387	11/29/2001		SRS		x	Xs			X	X	X
WT-CS-02-052	2001390	11/29/2001		SS		x	Xs			X	X	X
WT-CS-02-064	2001669	01/10/2002		SS			Xs			X		
WT-CS-03-036	2001360	11/29/2001		SRS		x	Xs			X	X	X
WT-CS-12-075	2001921	02/19/2002		SS			Xs					x
WT-SS-053	2002157	03/14/2002	0	SS			X			X	X	x
WT-SS-053	2002164	03/22/2002		SS		x	s					
WT-SS-054	2002158	03/14/2002	1.5	SS			X			x	X	X
WT-SS-054	2002165	03/22/2002		SS		x	S				S	
WT-SS-056	2002160	03/14/2002	1.5	SS			X			X	X	X
WT-SS-056	2002167	03/22/2002		SS		x	s					

Legend: x - mass, t - TCLP, s - SPLP, e - EPTOX, z - ZHE, d - Thermal Desorption, r - Charcoal Tube, a - SEM/AVS, f - filtered, nr - not received; Capitalized - at least one analyte in class detected

Printed on 09/24/2002

Table 2
SPLP AND MASS FOR SVOCS - SUMMARY OF ANALYTICAL RESULTS
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-02-050	WT-CS-02-050	WT-CS-02-052	WT-CS-02-052	WT-CS-02-064	WT-CS-03-036	WT-CS-03-036
	Sample ID	2001387	2001387	2001390	2001390	2001669	2001360	2001360
	Sample Date	11/29/2001	11/29/2001	11/29/2001	11/29/2001	01/10/2002	11/29/2001	11/29/2001
	Sample Time	09:25	09:25	09:55	09:55	12:50	09:40	09:40
	Sample Depth							
	Laboratory	PREM	PREM	PREM	PREM	PREM	PREM	PREM
	Lab. Number	E111C63-1A	E112212-1	E111C63-2A	E112212-2	E201358-5	E111C12-2A	E112212-3
Constituent	Units							
Date Semi-volatile Organics Analyzed	-	12/05/2001		12/04/2001		01/14/2002	12/03/2001	
Date of Semi-volatile SPLP Analysis	-		12/12/2001		12/12/2001	01/23/2002		12/12/2001
Hexachlorobenzene	ug/kg	<190 U		<180 U		<190 U	<380 U	
Hexachlorobenzene (SPLP)	ug/l		<10 U		<10 U	<5.0 U		<10 U
Hexachlorocyclopentadiene	ug/kg	<190 UJ		<180 U		<190 U	<380 U	
Hexachlorocyclopentadiene (SPLP)	ug/l					<5.0 U		
Acenaphthylene	ug/kg	<190 U		<180 U		<190 U	<380 U	
Acenaphthylene (SPLP)	ug/l					<5.0 U		
Acenaphthene	ug/kg	<190 U		<180 U		<190 U	<380 U	
Acenaphthene (SPLP)	ug/l					<5.0 U		
3-Nitroaniline	ug/kg	<930 U		<880 U		<950 U	<1900 UR	
3-Nitroaniline (SPLP)	ug/l					<10 U		
2-Nitroaniline	ug/kg	<930 U		<880 U		<950 U	<1900 UR	
2-Nitroaniline (SPLP)	ug/l					<10 U		
4-Chloroaniline	ug/kg	<370 U		<350 U		<380 U	<760 U	
4-Chloroaniline (SPLP)	ug/l					<10 U		
4-Nitroaniline	ug/kg	<370 U		<350 U		<380 U	<760 U	
4-Nitroaniline (SPLP)	ug/l					<10 U		
Anthracene	ug/kg	230		320		370	560	
Anthracene (SPLP)	ug/l					<5.0 U		
Benzo(a)anthracene	ug/kg	910		1500		1000	2400 J	
Benzo(a)anthracene (SPLP)	ug/l					<0.60 U		
Benzo(b)fluoranthene	ug/kg	950 J		2600		1000	2600 J	
Benzo(b)fluoranthene (SPLP)	ug/l					<0.80 U		
Nitrobenzene	ug/kg	<190 U		<180 U		<190 U	<380 U	
Nitrobenzene (SPLP)	ug/l		<10 U		<10 U	<5.0 U		<10 U
3,3'-Dichlorobenzidine	ug/kg	<190 U		<180 U		<190 U	<380 U	
3,3'-Dichlorobenzidine (SPLP)	ug/l					<5.0 U		

Table 2
SPLP AND MASS FOR SVOCS - SUMMARY OF ANALYTICAL RESULTS
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-02-050	WT-CS-02-050	WT-CS-02-052	WT-CS-02-052	WT-CS-02-064	WT-CS-03-036	WT-CS-03-036
	Sample ID	2001387	2001387	2001390	2001390	2001669	2001360	2001360
	Sample Date	11/29/2001	11/29/2001	11/29/2001	11/29/2001	01/10/2002	11/29/2001	11/29/2001
	Sample Time	09:25	09:25	09:55	09:55	12:50	09:40	09:40
	Sample Depth							
	Laboratory	PREM	PREM	PREM	PREM	PREM	PREM	PREM
	Lab. Number	E111C63-1A	E112212-1	E111C63-2A	E112212-2	E201358-5	E111C12-2A	E112212-3
Constituent	Units							
Benzo(a)pyrene	ug/kg	920 J		1600		1000	2300 J	
Benzo(a)pyrene (SPLP)	ug/l					<0.20 U		
Benzo(g,h,i)perylene	ug/kg	460 J		480		450	1400 J	
Benzo(g,h,i)perylene (SPLP)	ug/l					<5.0 U		
Benzo(k)fluoranthene	ug/kg	1000 J		770		950	2300 J	
Benzo(k)fluoranthene (SPLP)	ug/l					<5.0 U		
Carbazole	ug/kg	<190 U		<180 U		270	<380 U	
Carbazole (SPLP)	ug/l					<5.0 U		
Chrysene	ug/kg	1000		1500		1100	2600 J	
Chrysene (SPLP)	ug/l					<5.0 U		
4,6-Dinitro-2-Methylphenol	ug/kg	<190 UR		<180 U		<190 U	<380 UR	
4,6-Dinitro-2-Methylphenol (SPLP)	ug/l					<5.0 U		
4-Chloro-3-Methylphenol	ug/kg	<190 U		<180 U		<190 U	<380 U	
4-Chloro-3-Methylphenol (SPLP)	ug/l					<5.0 U		
Cresol,m- & p-	ug/kg	<190 U		<180 U		<190 U	<380 U	
Cresol,m- & p- (SPLP)	ug/l		<10 U		<10 U	<5.0 U		<10 U
2-Methylphenol (o-Cresol)	ug/kg	<190 U		<180 U		<190 U	<380 U	
2-Methylphenol (o-Cresol) (SPLP)	ug/l		<10 U		<10 U	<5.0 U		<10 U
Isophorone	ug/kg	<190 U		<180 U		<190 U	<380 U	
Isophorone (SPLP)	ug/l					<5.0 U		
Dibenz(a,h)anthracene	ug/kg	200 J		<180 U		200	620 J	
Dibenz(a,h)anthracene (SPLP)	ug/l					<5.0 U		
Dibenzofuran	ug/kg	<370 U		<350 U		<380 U	<760 U	
Dibenzofuran (SPLP)	ug/l					<10 U		
n-Nitrosodiphenylamine	ug/kg	<190 U		<180 U		<190 U	<380 U	
n-Nitrosodiphenylamine (SPLP)	ug/l					<5.0 U		
n-Nitrosodi-n-Propylamine	ug/kg	<190 U		<180 U		<190 U	<380 U	
n-Nitrosodi-n-Propylamine (SPLP)	ug/l					<5.0 U		

Table 2
SPLP AND MASS FOR SVOCS - SUMMARY OF ANALYTICAL RESULTS
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-02-050	WT-CS-02-050	WT-CS-02-052	WT-CS-02-052	WT-CS-02-064	WT-CS-03-036	WT-CS-03-036
	Sample ID	2001387	2001387	2001390	2001390	2001669	2001360	2001360
	Sample Date	11/29/2001	11/29/2001	11/29/2001	11/29/2001	01/10/2002	11/29/2001	11/29/2001
	Sample Time	09:25	09:25	09:55	09:55	12:50	09:40	09:40
	Sample Depth							
	Laboratory	PREM	PREM	PREM	PREM	PREM	PREM	PREM
	Lab. Number	E111C63-1A	E112212-1	E111C63-2A	E112212-2	E201358-5	E111C12-2A	E112212-3
Constituent	Units							
Hexachloroethane	ug/kg	<190 U		<180 U		<190 U	<380 U	
Hexachloroethane (SPLP)	ug/l		<10 U		<10 U	<5.0 U		<10 U
4-Bromophenyl Phenyl ether	ug/kg	<190 U		<180 U		<190 U	<380 U	
4-Bromophenyl Phenyl ether (SPLP)	ug/l					<5.0 U		
4-Chlorophenyl Phenyl ether	ug/kg	<190 U		<180 U		<190 U	<380 U	
4-Chlorophenyl Phenyl ether (SPLP)	ug/l					<5.0 U		
bis(2-Chloroisopropyl) ether	ug/kg	<370 U		<350 U		<380 U	<760 U	
bis(2-Chloroisopropyl) ether (SPLP)	ug/l					<10 U		
bis(2-Chloroethyl) ether (2-Chloroethyl	ug/kg	<190 U		<180 U		<190 U	<380 U	
bis(2-Chloroethyl) ether (2-Chloroethyl	ug/l					<5.0 U		
Fluoranthene	ug/kg	1700 J		2900		2400	3700 J	
Fluoranthene (SPLP)	ug/l					<5.0 U		
Fluorene	ug/kg	<190 U		<180 U		<190 U	<380 U	
Fluorene (SPLP)	ug/l					<5.0 U		
Indeno(1,2,3-c,d)pyrene	ug/kg	410 J		440		430	1300 J	
Indeno(1,2,3-c,d)pyrene (SPLP)	ug/l					<5.0 U		
bis(2-Chloroethoxy) Methane	ug/kg	<190 U		<180 U		<190 U	<380 U	
bis(2-Chloroethoxy) Methane (SPLP)	ug/l					<5.0 U		
2-Chloronaphthalene	ug/kg	<190 U		<180 U		<190 U	<380 U	
2-Chloronaphthalene (SPLP)	ug/l					<5.0 U		
2-Methylnaphthalene	ug/kg	<190 U		<180 U		<190 U	<380 U	
2-Methylnaphthalene (SPLP)	ug/l					<5.0 U		
Phenanthrene	ug/kg	1100		1500		1500	2700 J	
Phenanthrene (SPLP)	ug/l					<5.0 U		
Phenol	ug/kg	<190 U		<180 U		<190 U	<380 U	
Phenol (SPLP)	ug/l					<5.0 U		
2,4,5-Trichlorophenol	ug/kg	<190 U		<180 U		<190 U	<380 U	
2,4,5-Trichlorophenol (SPLP)	ug/l		<10 U		<10 U	<5.0 U		<10 U

Table 2
SPLP AND MASS FOR SVOCS - SUMMARY OF ANALYTICAL RESULTS
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-02-050	WT-CS-02-050	WT-CS-02-052	WT-CS-02-052	WT-CS-02-064	WT-CS-03-036	WT-CS-03-036
	Sample ID	2001387	2001387	2001390	2001390	2001669	2001360	2001360
	Sample Date	11/29/2001	11/29/2001	11/29/2001	11/29/2001	01/10/2002	11/29/2001	11/29/2001
	Sample Time	09:25	09:25	09:55	09:55	12:50	09:40	09:40
	Sample Depth							
	Laboratory	PREM	PREM	PREM	PREM	PREM	PREM	PREM
	Lab. Number	E111C63-1A	E112212-1	E111C63-2A	E112212-2	E201358-5	E111C12-2A	E112212-3
Constituent	Units							
2,4,6-Trichlorophenol	ug/kg	<190 U		<180 U		<190 U	<380 U	
2,4,6-Trichlorophenol (SPLP)	ug/l		<10 U		<10 U	<5.0 U		<10 U
2,4-Dichlorophenol	ug/kg	<190 U		<180 U		<190 U	<380 U	
2,4-Dichlorophenol (SPLP)	ug/l					<5.0 U		
2,4-Dinitrophenol	ug/kg	<190 U		<180 U		<190 U	<380 UR	
2,4-Dinitrophenol (SPLP)	ug/l					<5.0 U		
2-Chlorophenol	ug/kg	<190 U		<180 U		<190 U	<380 U	
2-Chlorophenol (SPLP)	ug/l					<5.0 U		
2-Nitrophenol	ug/kg	<190 U		<180 U		<190 U	<380 U	
2-Nitrophenol (SPLP)	ug/l					<5.0 U		
4-Nitrophenol	ug/kg	<190 U		<180 U		<190 U	<380 U	
4-Nitrophenol (SPLP)	ug/l					<5.0 U		
Pentachlorophenol	ug/kg	<190 U		<350 U		<190 U	<380 U	
Pentachlorophenol (SPLP)	ug/l		<10 U		<10 U	<5.0 U		<10 U
Benzyl Butyl Phthalate	ug/kg	<190 U		<180 U		<190 U	<380 UJ	
Benzyl Butyl Phthalate (SPLP)	ug/l					<5.0 U		
di-n-Butyl Phthalate	ug/kg	<190 U		<180 U		<190 U	<380 U	
di-n-Butyl Phthalate (SPLP)	ug/l					<5.0 U		
Diethyl Phthalate	ug/kg	<190 U		<180 U		<190 U	<380 U	
Diethyl Phthalate (SPLP)	ug/l					<5.0 U		
Dimethyl Phthalate	ug/kg	<190 U		<180 U		<190 U	<380 U	
Dimethyl Phthalate (SPLP)	ug/l					<5.0 U		
di-n-Octylphthalate	ug/kg	<190 UJ		<180 U		<190 U	<380 UJ	
di-n-Octylphthalate (SPLP)	ug/l					<5.0 U		
bis(2-Ethylhexyl) Phthalate	ug/kg	<190 U		<180 U		<190 U	2500	
bis(2-Ethylhexyl) Phthalate (SPLP)	ug/l					<5.0 U		
Pyrene	ug/kg	2000		2400		1900	6100 J	
Pyrene (SPLP)	ug/l					<5.0 U		

Table 2
SPLP AND MASS FOR SVOCS - SUMMARY OF ANALYTICAL RESULTS
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-02-050	WT-CS-02-050	WT-CS-02-052	WT-CS-02-052	WT-CS-02-064	WT-CS-03-036	WT-CS-03-036
	Sample ID	2001387	2001387	2001390	2001390	2001669	2001360	2001360
	Sample Date	11/29/2001	11/29/2001	11/29/2001	11/29/2001	01/10/2002	11/29/2001	11/29/2001
	Sample Time	09:25	09:25	09:55	09:55	12:50	09:40	09:40
	Sample Depth							
	Laboratory	PREM	PREM	PREM	PREM	PREM	PREM	PREM
	Lab. Number	E111C63-1A	E112212-1	E111C63-2A	E112212-2	E201358-5	E111C12-2A	E112212-3
Constituent	Units							
Pyridine (SPLP)	ug/l		<20 U		<20 U			<20 U
2,4-Dinitrotoluene	ug/kg	<190 U		<180 U		<190 U	<380 U	
2,4-Dinitrotoluene (SPLP)	ug/l		<10 U		<10 U	<5.0 U		<10 U
2,6-Dinitrotoluene	ug/kg	<190 U		<180 U		<190 U	<380 U	
2,6-Dinitrotoluene (SPLP)	ug/l					<5.0 U		
2,4-Dimethylphenol	ug/kg	<190 U		<180 U		<190 U	<380 U	
2,4-Dimethylphenol (SPLP)	ug/l					<5.0 U		
1,2,4-Trichlorobenzene	ug/kg	<190 U		<180 U		<190 U	<380 U	
1,2,4-Trichlorobenzene (SPLP)	ug/l					<5.0 U		
1,3-Dichlorobenzene	ug/kg	<190 U		<180 U		<190 U	<380 U	
1,3-Dichlorobenzene (SPLP)	ug/l					<5.0 U		
1,2-Dichlorobenzene	ug/kg	<190 U		<180 U		<190 U	<380 U	
1,2-Dichlorobenzene (SPLP)	ug/l					<5.0 U		
1,4-Dichlorobenzene	ug/kg	<190 U		<180 U		<190 U	<380 U	
1,4-Dichlorobenzene (SPLP)	ug/l		<10 U		<10 U	<5.0 U		<10 U
Hexachlorobutadiene	ug/kg	<190 U		<180 U		<190 U	<380 U	
Hexachlorobutadiene (SPLP)	ug/l		<10 U		<10 U	<5.0 U		<10 U
Naphthalene	ug/kg	<190 U		<180 U		<190 U	<380 U	
Naphthalene (SPLP)	ug/l					<5.0 U		

Table 2
SPLP AND MASS FOR SVOCS - SUMMARY OF ANALYTICAL RESULTS
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-12-075	WT-SS-053	WT-SS-053	WT-SS-054	WT-SS-054	WT-SS-056	WT-SS-056
	Sample ID	2001921	2002157	2002164	2002158	2002165	2002160	2002167
	Sample Date	02/19/2002	03/14/2002	03/22/2002	03/14/2002	03/22/2002	03/14/2002	03/22/2002
	Sample Time	12:10	08:30	08:10	08:43	08:18	09:10	08:33
	Sample Depth		0'		1.5'		1.5'	
	Laboratory	PREM	PREM	PREM	PREM	PREM	PREM	PREM
	Lab. Number	E202647-17	E203572-1	E203931-1A	E203572-2	E203931-2A	E203572-4	E203931-4A
Constituent	Units							
Date Semi-volatile Organics Analyzed	-	02/22/2002	03/16/2002		03/18/2002		03/18/2002	
Date of Semi-volatile SPLP Analysis	-	02/28/2002		03/26/2002		03/26/2002		03/27/2002
Hexachlorobenzene	ug/kg	<190 U	<180 U		<3800 U		<360 U	
Hexachlorobenzene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Hexachlorocyclopentadiene	ug/kg	<190 U	<180 U		<3800 U		<360 U	
Hexachlorocyclopentadiene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Acenaphthylene	ug/kg	240	<180 U		<3800 U		<360 U	
Acenaphthylene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Acenaphthene	ug/kg	<190 U	<180 U		5400		<360 U	
Acenaphthene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
3-Nitroaniline	ug/kg	<390 U	<360 U		<7600 U		<720 U	
3-Nitroaniline (SPLP)	ug/l	<10 U		<20 U		<20 U		<20 U
2-Nitroaniline	ug/kg	<390 U	<360 U		<7600 U		<720 U	
2-Nitroaniline (SPLP)	ug/l	<10 U		<20 U		<20 U		<20 U
4-Chloroaniline	ug/kg	<390 U	<360 U		<7600 U		<720 U	
4-Chloroaniline (SPLP)	ug/l	<10 U		<20 U		<20 U		<20 U
4-Nitroaniline	ug/kg	<390 U	<360 U		<7600 U		<720 U	
4-Nitroaniline (SPLP)	ug/l	<10 U		<20 U		<20 U		<20 U
Anthracene	ug/kg	<190 U	340		11000		470	
Anthracene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Benzo(a)anthracene	ug/kg	910	1100		26000		1500	
Benzo(a)anthracene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Benzo(b)fluoranthene	ug/kg	1100	1200		24000		1500	
Benzo(b)fluoranthene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Nitrobenzene	ug/kg	<190 U	<180 U		<3800 U		<360 U	
Nitrobenzene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
3,3'-Dichlorobenzidine	ug/kg	<190 U	<180 U		<3800 U		<360 U	
3,3'-Dichlorobenzidine (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U

Table 2
SPLP AND MASS FOR SVOCS - SUMMARY OF ANALYTICAL RESULTS
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-12-075	WT-SS-053	WT-SS-053	WT-SS-054	WT-SS-054	WT-SS-056	WT-SS-056
	Sample ID	2001921	2002157	2002164	2002158	2002165	2002160	2002167
	Sample Date	02/19/2002	03/14/2002	03/22/2002	03/14/2002	03/22/2002	03/14/2002	03/22/2002
	Sample Time	12:10	08:30	08:10	08:43	08:18	09:10	08:33
	Sample Depth		0'		1.5'		1.5'	
	Laboratory	PREM	PREM	PREM	PREM	PREM	PREM	PREM
	Lab. Number	E202647-17	E203572-1	E203931-1A	E203572-2	E203931-2A	E203572-4	E203931-4A
Constituent	Units							
Benzo(a)pyrene	ug/kg	1100	1000		25000		1600	
Benzo(a)pyrene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Benzo(g,h,i)perylene	ug/kg	510	350		9300		660	
Benzo(g,h,i)perylene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Benzo(k)fluoranthene	ug/kg	1300	1200		28000		1800	
Benzo(k)fluoranthene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Carbazole	ug/kg	<190 U	310		7000		<360 U	
Carbazole (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Chrysene	ug/kg	1300	1200		26000		1700	
Chrysene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
4,6-Dinitro-2-Methylphenol	ug/kg	<190 U	<180 U		<3800 U		<360 U	
4,6-Dinitro-2-Methylphenol (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
4-Chloro-3-Methylphenol	ug/kg	<190 U	<180 U		<3800 U		<360 U	
4-Chloro-3-Methylphenol (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Cresol,m- & p-	ug/kg	<190 U	<180 U		<3800 U		<360 U	
Cresol,m- & p- (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
2-Methylphenol (o-Cresol)	ug/kg	<190 U	<180 U		<3800 U		<360 U	
2-Methylphenol (o-Cresol) (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Isophorone	ug/kg	<190 U	<180 U		<3800 U		<360 U	
Isophorone (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Dibenz(a,h)anthracene	ug/kg	200	<180 U		3800		<360 U	
Dibenz(a,h)anthracene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Dibenzofuran	ug/kg	<390 U	<360 U		<7600 U		<720 U	
Dibenzofuran (SPLP)	ug/l	<10 U		<20 U		<20 U		<20 U
n-Nitrosodiphenylamine	ug/kg	<190 U	<180 U		<3800 U		<360 U	
n-Nitrosodiphenylamine (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
n-Nitrosodi-n-Propylamine	ug/kg	<190 U	<180 U		<3800 U		<360 U	
n-Nitrosodi-n-Propylamine (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U

Table 2
SPLP AND MASS FOR SVOCS - SUMMARY OF ANALYTICAL RESULTS
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-12-075	WT-SS-053	WT-SS-053	WT-SS-054	WT-SS-054	WT-SS-056	WT-SS-056
	Sample ID	2001921	2002157	2002164	2002158	2002165	2002160	2002167
	Sample Date	02/19/2002	03/14/2002	03/22/2002	03/14/2002	03/22/2002	03/14/2002	03/22/2002
	Sample Time	12:10	08:30	08:10	08:43	08:18	09:10	08:33
	Sample Depth		0'		1.5'		1.5'	
	Laboratory	PREM	PREM	PREM	PREM	PREM	PREM	PREM
	Lab. Number	E202647-17	E203572-1	E203931-1A	E203572-2	E203931-2A	E203572-4	E203931-4A
Constituent	Units							
Hexachloroethane	ug/kg	<190 U	<180 U		<3800 U		<360 U	
Hexachloroethane (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
4-Bromophenyl Phenyl ether	ug/kg	<190 U	<180 U		<3800 U		<360 U	
4-Bromophenyl Phenyl ether (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
4-Chlorophenyl Phenyl ether	ug/kg	<190 U	<180 U		<3800 U		<360 U	
4-Chlorophenyl Phenyl ether (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
bis(2-Chloroisopropyl) ether	ug/kg	<390 U	<360 U		<7600 U		<720 U	
bis(2-Chloroisopropyl) ether (SPLP)	ug/l	<10 U		<20 U		<20 U		<20 U
bis(2-Chloroethyl) ether (2-Chloroethyl	ug/kg	<190 U	<180 U		<3800 U		<360 U	
bis(2-Chloroethyl) ether (2-Chloroethyl	ug/l	<5.0 U		<10 U		<10 U		<10 U
Fluoranthene	ug/kg	2600	2200		50000		2400	
Fluoranthene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Fluorene	ug/kg	<190 U	<180 U		4600		<360 U	
Fluorene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Indeno(1,2,3-c,d)pyrene	ug/kg	510	350		9100		610	
Indeno(1,2,3-c,d)pyrene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
bis(2-Chloroethoxy) Methane	ug/kg	<190 UJ	<180 U		<3800 U		<360 U	
bis(2-Chloroethoxy) Methane (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
2-Chloronaphthalene	ug/kg	<190 U	<180 U		<3800 U		<360 U	
2-Chloronaphthalene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
2-Methylnaphthalene	ug/kg	<190 U	<180 U		<3800 U		<360 U	
2-Methylnaphthalene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Phenanthrene	ug/kg	1100	1500		38000		1700	
Phenanthrene (SPLP)	ug/l	<5.0 U		<10 U		14		<10 U
Phenol	ug/kg	<190 U	<180 U		<3800 U		<360 U	
Phenol (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
2,4,5-Trichlorophenol	ug/kg	<190 U	<180 U		<3800 U		<360 U	
2,4,5-Trichlorophenol (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U

Table 2
SPLP AND MASS FOR SVOCS - SUMMARY OF ANALYTICAL RESULTS
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-12-075	WT-SS-053	WT-SS-053	WT-SS-054	WT-SS-054	WT-SS-056	WT-SS-056
	Sample ID	2001921	2002157	2002164	2002158	2002165	2002160	2002167
	Sample Date	02/19/2002	03/14/2002	03/22/2002	03/14/2002	03/22/2002	03/14/2002	03/22/2002
	Sample Time	12:10	08:30	08:10	08:43	08:18	09:10	08:33
	Sample Depth		0'		1.5'		1.5'	
	Laboratory	PREM	PREM	PREM	PREM	PREM	PREM	PREM
	Lab. Number	E202647-17	E203572-1	E203931-1A	E203572-2	E203931-2A	E203572-4	E203931-4A
Constituent	Units							
2,4,6-Trichlorophenol	ug/kg	<190 U	<180 U		<3800 U		<360 U	
2,4,6-Trichlorophenol (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
2,4-Dichlorophenol	ug/kg	<190 U	<180 U		<3800 U		<360 U	
2,4-Dichlorophenol (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
2,4-Dinitrophenol	ug/kg	<190 U	<180 U		<3800 U		<360 U	
2,4-Dinitrophenol (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
2-Chlorophenol	ug/kg	<190 U	<180 U		<3800 U		<360 U	
2-Chlorophenol (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
2-Nitrophenol	ug/kg	<190 U	<180 U		<3800 U		<360 U	
2-Nitrophenol (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
4-Nitrophenol	ug/kg	<190 U	<180 U		<3800 U		<360 U	
4-Nitrophenol (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Pentachlorophenol	ug/kg	<190 U	<180 U		<3800 U		<360 U	
Pentachlorophenol (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Benzyl Butyl Phthalate	ug/kg	<190 U	<180 U		<3800 U		<360 U	
Benzyl Butyl Phthalate (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
di-n-Butyl Phthalate	ug/kg	<190 U	<180 U		<3800 U		<360 U	
di-n-Butyl Phthalate (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Diethyl Phthalate	ug/kg	<190 U	<180 U		<3800 U		<360 U	
Diethyl Phthalate (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Dimethyl Phthalate	ug/kg	<190 U	<180 U		<3800 U		<360 U	
Dimethyl Phthalate (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
di-n-Octylphthalate	ug/kg	<190 U	<180 U		<3800 U		<360 U	
di-n-Octylphthalate (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
bis(2-Ethylhexyl) Phthalate	ug/kg	<190 U	<180 U		<3800 U		<360 U	
bis(2-Ethylhexyl) Phthalate (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Pyrene	ug/kg	2000	2900		67000		4000	
Pyrene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U

Table 2
SPLP AND MASS FOR SVOCS - SUMMARY OF ANALYTICAL RESULTS
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-12-075	WT-SS-053	WT-SS-053	WT-SS-054	WT-SS-054	WT-SS-056	WT-SS-056
	Sample ID	2001921	2002157	2002164	2002158	2002165	2002160	2002167
	Sample Date	02/19/2002	03/14/2002	03/22/2002	03/14/2002	03/22/2002	03/14/2002	03/22/2002
	Sample Time	12:10	08:30	08:10	08:43	08:18	09:10	08:33
	Sample Depth		0'		1.5'		1.5'	
	Laboratory	PREM	PREM	PREM	PREM	PREM	PREM	PREM
	Lab. Number	E202647-17	E203572-1	E203931-1A	E203572-2	E203931-2A	E203572-4	E203931-4A
Constituent	Units							
Pyridine (SPLP)	ug/l							
2,4-Dinitrotoluene	ug/kg	<190 U	<180 U		<3800 U		<360 U	
2,4-Dinitrotoluene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
2,6-Dinitrotoluene	ug/kg	<190 U	<180 U		<3800 U		<360 U	
2,6-Dinitrotoluene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
2,4-Dimethylphenol	ug/kg	<190 U	<180 U		<3800 U		<360 U	
2,4-Dimethylphenol (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
1,2,4-Trichlorobenzene	ug/kg	<190 U	<180 U		<3800 U		<360 U	
1,2,4-Trichlorobenzene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
1,3-Dichlorobenzene	ug/kg	<190 U	<180 U		<3800 U		<360 U	
1,3-Dichlorobenzene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
1,2-Dichlorobenzene	ug/kg	<190 U	<180 U		<3800 U		<360 U	
1,2-Dichlorobenzene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
1,4-Dichlorobenzene	ug/kg	<190 U	<180 U		<3800 U		<360 U	
1,4-Dichlorobenzene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Hexachlorobutadiene	ug/kg	<190 U	<180 U		<3800 U		<360 U	
Hexachlorobutadiene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U
Naphthalene	ug/kg	<190 U	<180 U		<3800 U		<360 U	
Naphthalene (SPLP)	ug/l	<5.0 U		<10 U		<10 U		<10 U

Table 3
SPLP AND MASS FOR SVOCS - SUMMARY OF ANALYTICAL RESULTS (DETECTS)
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-CS-02-050	WT-CS-02-052	WT-CS-02-064	WT-CS-03-036	WT-CS-12-075	WT-SS-053	WT-SS-054
	Sample ID	2001387	2001390	2001669	2001360	2001921	2002157	2002158
	Sample Date	11/29/2001	11/29/2001	01/10/2002	11/29/2001	02/19/2002	03/14/2002	03/14/2002
	Sample Time	09:25	09:55	12:50	09:40	12:10	08:30	08:43
	Sample Depth						0'	1.5'
	Laboratory	PREM	PREM	PREM	PREM	PREM	PREM	PREM
	Lab. Number	E111C63-1A	E111C63-2A	E201358-5	E111C12-2A	E202647-17	E203572-1	E203572-2
Constituent	Units							
Date Semi-volatile Organics Analyzed	-	12/05/2001	12/04/2001	01/14/2002	12/03/2001	02/22/2002	03/16/2002	03/18/2002
Date of Semi-volatile SPLP Analysis	-							
Acenaphthylene	ug/kg					240		
Acenaphthene	ug/kg							5400
Anthracene	ug/kg	230	320	370	560		340	11000
Benzo(a)anthracene	ug/kg	910	1500	1000	2400 J	910	1100	26000
Benzo(b)fluoranthene	ug/kg	950 J	2600	1000	2600 J	1100	1200	24000
Benzo(a)pyrene	ug/kg	920 J	1600	1000	2300 J	1100	1000	25000
Benzo(g,h,i)perylene	ug/kg	460 J	480	450	1400 J	510	350	9300
Benzo(k)fluoranthene	ug/kg	1000 J	770	950	2300 J	1300	1200	28000
Carbazole	ug/kg			270			310	7000
Chrysene	ug/kg	1000	1500	1100	2600 J	1300	1200	26000
Dibenz(a,h)anthracene	ug/kg	200 J		200	620 J	200		3800
Fluoranthene	ug/kg	1700 J	2900	2400	3700 J	2600	2200	50000
Fluorene	ug/kg							4600
Indeno(1,2,3-c,d)pyrene	ug/kg	410 J	440	430	1300 J	510	350	9100
Phenanthrene	ug/kg	1100	1500	1500	2700 J	1100	1500	38000
Phenanthrene (SPLP)	ug/l							
bis(2-Ethylhexyl) Phthalate	ug/kg				2500			
Pyrene	ug/kg	2000	2400	1900	6100 J	2000	2900	67000

Table 3
SPLP AND MASS FOR SVOCS - SUMMARY OF ANALYTICAL RESULTS (DETECTS)
REMEDIAL ACTION REPORT - WILLOW BROOK AND WILLOW BROOK POND

Loureiro Engineering Associates, Inc.

	Location ID	WT-SS-054	WT-SS-056
	Sample ID	2002165	2002160
	Sample Date	03/22/2002	03/14/2002
	Sample Time	08:18	09:10
	Sample Depth		1.5'
	Laboratory	PREM	PREM
	Lab. Number	E203931-2A	E203572-4
Constituent	Units		
Date Semi-volatile Organics Analyzed	-		03/18/2002
Date of Semi-volatile SPLP Analysis	-	03/26/2002	
Acenaphthylene	ug/kg		
Acenaphthene	ug/kg		
Anthracene	ug/kg		470
Benzo(a)anthracene	ug/kg		1500
Benzo(b)fluoranthene	ug/kg		1500
Benzo(a)pyrene	ug/kg		1600
Benzo(g,h,i)perylene	ug/kg		660
Benzo(k)fluoranthene	ug/kg		1800
Carbazole	ug/kg		
Chrysene	ug/kg		1700
Dibenz(a,h)anthracene	ug/kg		
Fluoranthene	ug/kg		2400
Fluorene	ug/kg		
Indeno(1,2,3-c,d)pyrene	ug/kg		610
Phenanthrene	ug/kg		1700
Phenanthrene (SPLP)	ug/l	14	
bis(2-Ethylhexyl) Phthalate	ug/kg		
Pyrene	ug/kg		4000

Appendix S

Documentation of Engineered Control Areas

MAP REFERENCE:

FLIGHT DATA WAS COMBINED TO CREATE A SITE RESTORATION AS-BUILT TOPOGRAPHIC MAP.

PHOTOGRAMMETRIC MAP, FLIGHT ON APRIL 7, 2002, MAP SCALE: 1" = 40', PHOTO SCALE: 1" = 350', CONTOUR INTERVAL = 1 FOOT, BY GOLDEN AERIAL SURVEYS, INC. – PROJECT REF.: P&W, EAST HARTFORD-GAS02-46.

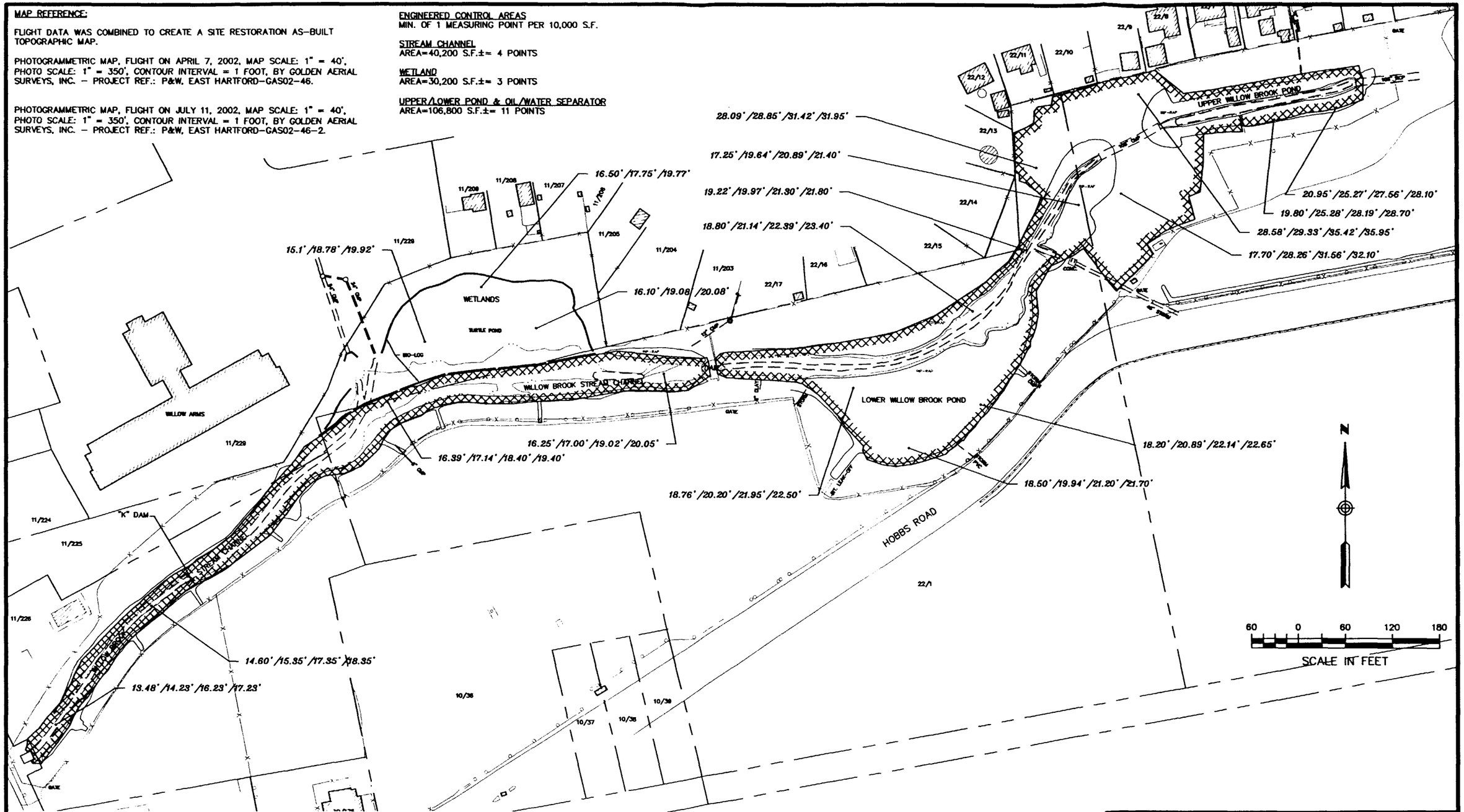
PHOTOGRAMMETRIC MAP, FLIGHT ON JULY 11, 2002, MAP SCALE: 1" = 40', PHOTO SCALE: 1" = 350', CONTOUR INTERVAL = 1 FOOT, BY GOLDEN AERIAL SURVEYS, INC. – PROJECT REF.: P&W, EAST HARTFORD-GAS02-46-2.

ENGINEERED CONTROL AREAS
MIN. OF 1 MEASURING POINT PER 10,000 S.F.

STREAM CHANNEL
AREA=40,200 S.F.±= 4 POINTS

WETLAND
AREA=30,200 S.F.±= 3 POINTS

UPPER/LOWER POND & OIL/WATER SEPARATOR
AREA=106,800 S.F.±= 11 POINTS



LEGEND

STREAM CHANNEL
ELEV. ● EXCAVATION/
● 9" ORGANIC/
● 15" (SIDE SLOPE) OR 24" (CHANNEL) RIPRAP
● 12" COBBLE-GRAVEL-SAND
17.50'/18.25'/19.50'/20.50'

WETLAND
ELEV. ● EXCAVATION/
● 24" GRANULAR FILL/
● 12"+ ORGANIC
18.25'/20.25'/21.25'

UPPER, LOWER PONDS & OIL/WATER SEPARATOR
ELEV. ● EXCAVATION/
● 9" ORGANIC/
● 21" GRANULAR FILL
● 6" STONE LAYER
17.50'/18.25'/20.00'/20.50'

GUARDRAIL/GUIDE WIRE
FENCE
EDGE OF PAVEMENT
PROPERTY LINE

10/39 ASSESSOR MAP No./LOT No.
BUILDING/STRUCTURE
LOW FLOW CHANNEL
BIO-LOG
LIMIT OF ENGINEERED CONTROL

REMEDIAL ACTION REPORT
WILLOW BROOK & WILLOW BROOK POND
DOCUMENTATION OF ENGINEERED CONTROL AREAS

Comm.No.	Appendix S	LEA
88UT103		

rawpNov02-Appendix-S.dwg

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Appendix T

Mitigation Plan and As-Built Closeout Plan

WILLOW BROOK/WILLOW BROOK POND
PCB REMEDIATION PROJECT
ARMY CORPS OF ENGINEERS
MITIGATION PLAN

July 2001
Revised: January 2002
Revised: February 2002

Prepared for

UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY DIVISION
One Financial Plaza
Hartford, CT 06101

Prepared by

ENVIRONMENTAL PLANNING SERVICES
89 Belknap Road
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LOUREIRO ENGINEERING ASSOCIATES
100 Northwest Drive
Plainville, Connecticut

Comm. No. 88UT002

Table of Contents

FIGURES

APPENDICIES

1. INTRODUCTION

Loureiro Engineering Associates, Inc. (LEA) was retained by United Technologies Corporation/Pratt & Whitney (UTC/P&W) to perform investigations and evaluation of remedial alternatives to address soil and sediments contaminated with polychlorinated biphenyls (PCBs) within and immediately surrounding Willow Brook and Willow Brook Pond at the UTC/P&W manufacturing facility in East Hartford, Connecticut. LEA completed a comprehensive subsurface investigation of the site during the period from December 1997 to April 1999. The results of the investigation form the basis upon which the proposed remediation approach was developed. The proposed remediation plan has been presented in detail in the documents entitled *Remedial Action Work Plan - United Technologies Corporation, Pratt & Whitney, Willow Brook and Willow Brook Pond, East Hartford, CT,* dated November 2000, revised May 2001 and *Request for Variance – Engineered Control of Polluted Soils – United Technologies Corporation – Pratt & Whitney – Willow Brook and Willow Brook Pond – East Hartford, CT*, dated January 2001, revised May 2001 by Loureiro Engineering Associates, Inc. The Remedial Action Work Plan and Request for Variance – Engineered Control of Polluted Soils have both been submitted to the Connecticut Department of Environmental Protection (DEP) for review, comment, and approval.

This report represents the results of investigations conducted at the site by Environmental Planning Services (EPS) and Loureiro Engineering Associates, Inc. (LEA). The purpose of the investigations was to assess the current status of existing wetland functions and values, fish and wildlife habitats and populations, state and federal endangered and threatened species, and water quality and uses in support of an evaluation of the effects of the project on each. Specifically, this report has been prepared in support of the Army Corps of Engineers Permit Application and the Army Corp's requests made as part of the Provisional Permit for the project. This report provides a candid discussion of the effects of the proposed activity on wetlands (functions and values), fish and wildlife resources (habitats and populations), state and federal endangered and threatened species and state species of special concern, stream flows, state water quality standards and designated uses of waters of the state, public water supplies, wastewater treatment needs, the capacity of waters to assimilate wastes, ground water recharge/discharge, ground water availability, private and public water supply wells, agriculture, and water-based recreation.

The following is a general description of the contents of each of the following sections of the report.

- Section 2 presents a discussion regarding the current condition of the site and a summary of the components of the proposed project.

- Section 3 presents a discussion of the proposed project activities for the site including construction activities and controls used throughout the project.

- Section 4 presents a discussion of the current wetland and watercourse functions and values and an evaluation of the effects (both temporal and, as appropriate, cumulative) of the project on the wetland and watercourse functions and values.

- Section 5 presents a discussion of the current fish and wildlife habitats and populations and an evaluation of the effects (both temporal and, as appropriate, cumulative) of the project on the fish and wildlife habitats and populations.

- Section 6 presents a discussion of the current water quality and uses within the project area and an evaluation of the effects (both temporal and, as appropriate, cumulative) of the project on the water quality and uses.

- Section 7 presents a detailed protocol for the monitoring requirements associated with wetland and restoration and enhancement at the project site.

- Section 8 presents conclusions regarding the effects of the project on each of the elements discussed in each of the above Sections.

It should be noted, reference is made throughout the text to drawings depicting the site and elements of the design of the proposed project activity. To maintain the readability of the text, all drawings are provided in Appendix A of this plan.

2. GENERAL

2.1 General Site Description

The project site begins at Main Street in East Hartford and proceeds east in an upstream direction for a distance of approximately 2,200 feet (see Figure 2-1). Regulated activities to be performed as part of the proposed project include the excavation of approximately 12,500 cubic yards (in-place volume) of contaminated soil and sediment from within and immediately surrounding Willow Brook and Willow Brook Pond and regrading of side slopes of Willow Brook below the dam between Willow Brook and Willow Brook Pond. Excavation areas are depicted on drawings of the proposed project in Appendix A of the report. The side-slope regrading is being performed to establish a permanent and stable side slope as observations indicate slope failures in steeper sections of the banks along Willow Brook. The total area affected by the project is approximately 4.5 acres. Of these 4.5 acres, 3.15 acres are State of Connecticut Inland Wetlands and 3.02 acres are Federal jurisdictional wetlands. These acreages include 2.41 acres of waterway (as determined by the ordinary high water line for Willow Brook (between 20 and 23 feet along the reach) and Willow Brook Pond (28 feet)). All elevations presented are referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29).

A single concrete dam exists immediately between the upper reach of Willow Brook and the lower extreme of Willow Brook Pond. This concrete dam maintains the water level in Willow Brook Pond at a relatively constant elevation of 28 feet (NGVD 29). The larger impoundment (the lower Willow Brook Pond) is located immediately upstream of the previously noted wetland and consists of approximately 1.31 acres. The smaller impoundment (upper Willow Brook Pond) is located approximately 80 feet upstream of the lower Willow Brook Pond. The two ponds are connected by a single 108-inch diameter corrugated metal culvert, approximately 80 feet long. The smaller impoundment (Upper Willow Pond) is approximately 0.30 acres in size and is fed by an approximately 2,000-foot long, culverted section of Willow Brook. All of the areas adjacent to the wetlands and watercourses are steeply sloped and there is evidence of bank erosion and slumping in many areas.

The general project environs can be described as urbanized. The site is bounded by the Pratt & Whitney main East Hartford manufacturing facility on the south and east, by commercial land uses along Main Street in East Hartford on the west and northwest, by a multi-family, multi-story residential building and associated parking on the north, and by small lot, single family residences on the northwest. There is little native soil or vegetation in the project area. Much of the area is paved or in lawn.

2.2 Bedrock Geology

Bedrock beneath the UTC/P&W facility consists of red sandstone and siltstone of the Portland Formation. Depth to bedrock within the facility boundaries is over 300 feet in the Main Plant Area, and approximately 30 feet along the eastern property boundary. Near the western property boundary along the Connecticut River, depth to bedrock is about 150 feet. A north/south trending, buried bedrock valley underlies the UTC/P&W facility; this buried valley may have been a pre-glacial channel of an ancient river following a similar course to that of the Connecticut River.

2.3 Surficial Geology

Unconsolidated sediments overlying bedrock are approximately 200' to more than 300' thick. The upper 20'± are classified as stream terrace deposits (Qst) and artificial fill (af). The stream terrace deposits lies primarily north of Willow Brook. These are yellowish-brown, well stratified, medium to fine-grained sand and silt

These surficial materials are underlain by lacustrine clays deposited in Glacial Lake Hitchcock. In the project area, these clays range in thickness from 150-to greater than 250'. In some areas, these clays are massive, and in other areas they consist of alternating layers or varves of clay and silt or very fine sand. The upper portion of the varved silt and clay typically consists of thick-bedded, yellowish-brown silt, grading upward into thin-bedded fine to medium sand.

The artificial fill south of Willow Brook consists of earthen material typically greater than 5' in thickness. The source of the fill may be till, sand and gravel, or clay.

2.4 Soils

The soil mapping for the site reflects the surficial geology and the local land use patterns. The area south of the Brook is primarily Urban Land (UR) and Udorthents (UD). Urban Land consists primarily of roads, parking lots, drives, and buildings. Udorthents consist primarily of areas that have been cut, or filled, or otherwise altered, so that the natural soil profile can no longer be discerned. The north side of Willow Brook consists primarily, of Udorthents and Urban Land, but also includes the natural Windsor loamy fine sand terrace soil in the area of the single-family homes.

The mapped wetland soils include Carlisle Muck, (Ce) and Saco silt loam (Sb) in the vicinity of the existing emergent marsh. These soils are very poorly drained, and have a high water table at near the surface most of the year. There are also small pockets of wetland soils along the toe of

the bank of Willow Brook. These include Fluvaquents; hydric soils that are subject to frequent flooding, and Fluvents, that are not hydric and only subject to short term flooding, typically in the spring. Both of these soils are classified as wetlands in CT due to their origin in recent alluvium. The soils are described in more detail in Appendix B of this document.

2.5 Vegetation

As noted above, the project site lies in an urbanized area, and is bordered by parking lots, industrial, commercial, multi-family residential and single family residential land uses. As such, the predominate vegetation type in the surrounding area is maintained as turf and ornamental landscaping. However, the immediate vicinity of the brook, as well as the wetland and a portion of the pond banks do support non-maintained vegetation. The descriptions that follow are based on field investigations conducted during late January 2001.

Willow Brook channel- The banks of Willow Brook below the pond and wetland consist of steep slopes primarily supporting invasive, non-native species. Dense stands of Japanese Knotweed (Polygonum cuspidatum) and scattered Multiflora Rose (*Rosa multiflora*) are common. Brambles (*Rubus spp.*), Staghorn Sumac (*Rhus typhina*), Asiatic *Bittersweet (Celastrus orbiculatus*) and Poison Ivy (*Toxicodendron radicans*) are also present. There are scattered trees along the Brook, including Red Maple (*Acer rubrum*), Tree-of-Heaven (*Alianthus altissima*), Catalpa (*Catalpa speciosa*), Black Willow (*Salix nigra*) and a single Sycamore (*Platanus occidentalis*).

Wetland- A broad, herbaceous wetland lies between the stream section and the lower pond or impoundment. Broad-leafed Cattail (*Typha latifolia*) and Purple Loosestrife (*Lythrum salicaria*) are the two most common persistent species. Tussock Sedge (*Carex stricta*), Water Willow (*Decodon verticllatus*), asters (*Aster spp.*), dock (Rumex sp.), Jewelweed (*Impatiens capensis*), Rice cutgrass (*Leersia oryzoides*), willow herb (*Epilobium sp.*), and Soft Rush (*Juncus effusus*) were also present. This area may be characterized as a very wet meadow and shallow marsh.

The edge of the wetland lies at a slightly higher elevation and has a woody fringe. Typical species include floodplain and wetland plants, such as Black Willow (*Salix nigra*), Red Maple (*Acer rubrum*), Eastern Cottonwood (*Populus deltoides*), Black Gum (*Nyssa sylvatica*), American Elm (*Ulmus americana*), Elderberry (*Sambuca canadensis*), Silky Dogwood (*Cornus ammomum*), Northern Arrow-wood (*Viburnum recognitum*), and Buttonbush (*Cephalanthus occidentalis*).

Lower Pond- Willow Brook is impounded behind a small, concrete dam to form this 1.31-acre acre pond. The Brook inlets to the pond through a 108-inch corrugated metal pipe culvert, and exits via a gated overflow that maintains a constant pond elevation of 28 ft. Tree cover on the southern shore of the pond is confined to the area immediately adjacent to the dam where there is a small plantation of Eastern White Pine (*Pinus strobus*). White Pines area also present along the northern shoreline. There are dense groupings of ornamental (non-native) evergreen shrubs along the south shore of the pond, as well. This pond also contains an inlet from a once through cooling water system from the main manufacturing facility.

Upper Pond- Willow Brook enters the upper pond from a 108-inch diameter concrete culvert, and exits into another culvert that feeds the lower pond. The shores of the pond are steep and support a dense growth of saplings and tall slender shrubs. Tree-of-Heaven, Black Willow and Speckled Alder (*Alnus rugosa*) are common.

3. PROPOSED PROJECT ACTIVITY

The proposed project activity is necessary as United Technologies Corporation, Pratt & Whitney Division (UTC/P&W) is currently responding to a Notice of Violation (NOV) which was issued by the Connecticut Department of Environmental Protection (DEP). The NOV was issued as a result of the identification of an oil seep through sediments during the routine draining of Willow Brook Pond in September 1997. UTC/P&W reported the sheen to the United States Coast Guard and the DEP in accordance with discharge reporting requirements. Following the detection of PCBs in a sample, the DEP issued P&W a NOV, No. PCB 97-08, on November 7, 1997. In response to the NOV, during the period from December 1997 to April 1999, UTC/P&W developed a sampling work plan and conducted three phases of remedial investigation. These investigations provided the analytical data to sufficiently define the horizontal and vertical limits of contamination and provided the basis for the development of a remediation plan. The remediation of PCB contaminated soil and sediment is mandatory and is supported by a determination of need as documented in a letter from the United States Environmental Protection Agency RCRA Corrective Action Program. Furthermore, UTC/P&W are in the process of negotiating a Consent Order with the DEP Bureau of Water Management. The Consent Order will be issued prior to the initiation of construction activities (June of 2001) and will require the remediation of the PCB contaminated soil and sediment.

The proposed project activity for Willow Brook and Willow Brook Pond involves the excavation and offsite disposal of soil and sediment containing total PCB concentrations in excess of 25 ppm. A single area within the southern limits of Willow Brook Pond may also be remediated to remove sediments containing PCBs at concentrations in excess of 1 ppm. For the purposes of this document, it has been assumed that this area will be remediated to remove sediment containing PCBs at concentrations in excess of 1 ppm. The remediation plan for the wetland area located north of Willow Brook involves the excavation and offsite disposal of soil and sediment containing PCB concentrations in excess of 1 ppm. Following excavation and removal of the impacted soil and sediment within Willow Brook and Willow Brook Pond, a cap consisting of an organic rich soil layer, a gravel layer, a stone layer, and a sand, gravel, and cobble layer will be placed within the limits of Willow Brook and Willow Brook Pond. The dam structure between Willow Brook Pond and the open channel section of Willow Brook will remain intact. The area will be restored to much the same configuration as exists today with two ponds (upper and lower Willow Brook Ponds) and an open channel (Willow Brook) from the downstream end of the pond to the cross culvert at Main Street. The existing wetland downstream of the pond will also be restored.

Soil and sediment within Willow Brook and Willow Brook Pond are also impacted by semi-volatile organic compounds (SVOCs), metals, and petroleum hydrocarbons. During the removal of PCB contaminated soil and sediment, a large percentage of the soils and sediment impacted by these constituents will also be removed. In any event, any remaining contamination will be capped as noted previously. Following remediation, UTC/P&W will implement two institutional controls to ensure the long-term protectiveness of the proposed remedy. The institutional controls consist of 1) a deed restriction to ensure the affected area will not be used for residential purposes and to prohibit excavation and 2) installation of a fence around the entire area to preclude access to Willow Brook and Willow Brook Pond.

3.1 General

This section details the work to be completed during the project. The section begins with a discussion of the construction activities including site preparation, the demolition and removal of existing structures, contaminated soil and sediment excavation and offsite disposal, wetlands restoration, site restoration activities, implementation of institutional controls, and record keeping and reporting. The last part of this section details post-construction activities. This includes a discussion on the preparation of a post-remediation report detailing the remediation activities and a post-remediation groundwater-monitoring program.

A Health and Safety Plan (HASP) will be prepared prior to the initiation of construction activities. The HASP will detail safety organization, procedures, and personal protective equipment that are based on an analysis of potential site-specific hazards. The HASP, will meet the requirements of 29 CFR 1910 and 29 CFR 1926 (which includes 29 CFR 1910.120 and 29 CFR 1926.65). The HASP will include, but will not be limited to, the following components:

- Identification of key personnel - All on-site personnel involved with the construction activities at the site will be required to maintain Occupational Safety and Health Administration (OSHA) 40-hour Hazardous Waste Training (29 CFR 1910.120 and 29 CFR 1926.65) and the corresponding 8-hour refresher course update

- Training – A description of health and safety training requirements for supervisory and on-site personnel will be presented. Training requirements will include attending an initial site orientation prior to performing on-site activities

- Medical Surveillance – A description of appropriate medical examinations required for supervisory and on-site personnel.

- Site Hazards – A description of chemical, physical, and climatological hazards associated with the project.

- Work Zones – A description of the work zones that will be established during construction activities.

- Personnel Safety Equipment and Protective Clothing – A description of personnel protective equipment and protective clothing to be used and available on site.

- Equipment Cleaning – The methods and procedures for decontamination of personnel, materials, and equipment will be described.

- Confined Space Entry – A listing of confined spaces and description of procedures for confined space entry in accordance with Permit Required Confined Space Entry (29 CFR 1910.146).

- Excavation Safety – A description of excavation and trenching safety procedures as specified in 29 CFR 1926 Subpart P.

- Standard Operating Procedures and Safety Programs as required by applicable portions of 29 CFR 1910 and 29 CFR 1926.

3.2 Construction Activities

The proposed construction activities involve:

- The excavation and offsite disposal of approximately 8,500 cubic yards of soil and sediment containing PCBs at concentrations greater than 25 ppm from within and immediately surrounding Willow Brook and Willow Brook Pond;

- The excavation and offsite disposal of approximately 1,500 cubic yards of soil and sediment containing PCBs at concentrations between 1 and 25 ppm from within and immediately surrounding the wetland area located north of Willow Brook;

- The excavation and offsite disposal of approximately 2,500 cubic yards of soil and sediment from within the open channel of Willow Brook to allow for the installation of the geotextile, soil, and stone cap (engineered control) within the stream channel;

- The demolition and offsite disposal of the existing Process Water Facility;

- The removal and offsite disposal of an oil/water separator and the excavation and offsite disposal of impacted soil in the vicinity of the oil/water separator and the placement of a composite (flexible membrane liner and soil) cap (engineered control) over and beyond the limits of the excavated area;

- The placement of a geotextile, soil and stone cap (engineered control) over the entirety of the excavated area within Willow Brook and Willow Brook Pond

- (except an approximately 1-acre wetland as described below) to isolate sediment containing less than 25 ppm total PCBs commingled with semi-volatile organic compounds, petroleum hydrocarbons, and select metals;

- The restoration of an approximately 1-acre wetland located downstream of the Willow Brook Pond Dam; and

- The implementation of two institutional controls to prevent disturbance of the engineered control consisting of 1) a deed restriction to ensure the affected area will not be used for residential purposes and to prohibit excavation; and 2) installation of a fence around the entire area to preclude access to Willow Brook and Willow Brook Pond.

The following parts of this section describe in general each of the anticipated construction activities necessary to complete the remediation.

3.2.1 Site Preparation

The following is a general description of anticipated site preparation activities.

Erosion Control

Appropriate soil erosion and sedimentation control methods (e.g., silt fence, straw bale dikes, absorbent booms, etc.) will be installed to mitigate the transport of suspended solids or sediments downstream. A soil erosion and sediment control plan is a component of applications for local. Due to the magnitude of excavation to accomplish the removal of contaminated soil and sediment, excavation activities will not be performed during periods of heavy precipitation.

Clearing and Grubbing

The area in the immediate vicinity of Willow Brook and Willow Brook Pond is covered with a variety of vegetation, including the wetland areas (See Drawings SP 1 of 6 through SP 6 of 6 in Appendix A of this document). Vegetation ranges from mowed grass to mature trees. To gain access to perform the planned excavation activities, clearing and grubbing will be required. Cutting, processing, and appropriate disposal of heavy vegetation will be a component of the project.

Decontamination Facilities

Contractor equipment that has been in contact with contaminated soil and sediment will require decontamination prior performing work in an uncontaminated area or demobilization from the site. Decontamination pads will be strategically located at the site adjacent to the excavations.

The decontamination pads will generally be constructed of a wood frame or similar materials, lined with heavy plastic, and include a layer of open stone. Equipment that has come into contact with contaminated soil and sediment will be cleaned with a pressure washer over the decontamination pad.

Field sampling equipment (e.g., stainless steel trowels, plastic scoops, shovels, etc.) used to implement the Field Sampling and Analysis Plan will be decontaminated prior to each sample location to mitigate the potential for cross-contamination of samples collected for laboratory analysis.

Wash water and detergents used in the decontamination process will be disposed of, following any necessary treatment, via the sanitary sewer in accordance with the terms and conditions of the CTDEP General Permit for the Discharge of Groundwater Remediation Wastewater.

Site Security

Limiting access to the site during construction will be accomplished thorough the use of both existing permanent fencing (along the north side of Willow Brook and Willow Brook Pond) and 6-foot high temporary construction fencing to be installed along the southern project boundary along Willow Street. The fencing will be supplemented by the use of security personnel to ensure that unauthorized persons do not access the construction site during remediation activities.

3.2.2 Caps and Wetland Restoration

Following the excavation and demolition activities, Willow Brook and Willow Brook Pond will be restored. The planned restoration activities are described in detail below and depicted on drawings SR 1 of 6 though SR 6 of 6 and DET 1 of 9 through DET 9 of 9 of Appendix A of this document. The site restoration involves the installation of 3 types of caps over soil and sediments remaining following excavation and removal of soil and sediment containing total PCBs at concentrations greater than 25 ppm. The cap details were derived based on the anticipated stream flow velocities and considered the ultimate use of the area as a combined wetland, pond, and stream channel. The base of each cap consists of a non-woven geotextile, a 9-inch layer of organic rich soil, and a non-woven geotextile. This layer is referred to below as an organic-rich layer. This organic-rich layer is included as a contingency to mitigate any potential for PCBs to migrate vertically upward through the proposed soil and rock cap. Each cap described below is depicted on drawings DET 1 of 9 through DET 9 of 9 in Appendix A of this document.

- Within Willow Brook Pond, a 36-inch soil and stone cap is proposed refer to Drawing DET 2 of 9 in Appendix A of this document). The cap will consist of a 9 inch organic rich layer, 21 inches of process gravel, and a 6-inch layer of 4-inch stone. As the flow velocity in Willow Brook Pond is extremely low and is controlled by the dam at the outlet to the pond, the stone lining will provide adequate protection against erosion.

- Within Willow Brook (downstream of the dam), a 36-inch soil and stone cap is proposed (refer to Drawing DET 1 of 9 in Appendix A of this document). The cap will consist of a 9-inch organic rich layer, a 15-inch layer of modified rip-rap and a 12-inch layer of cobbles, gravel and coarse sand. The 15-inch layer of modified rip-rap extends the width of the channel bottom and transitions into a 24-inch layer of intermediate rip-rap on the side slopes of the channel banks. The 24-inch layer of modified rip-rap extends up the channel banks to the elevation of the 10 year flood. The rip-rap channel lining has been designed to withstand the erosive forces anticipated in the stream channel following completion of the construction project.

- The area of the underground oil/water separator will be provided with a composite cap (refer to Drawing DET 4 of 9 in Appendix A of this document). The composite cap will consist of a 40-mil flexible membrane liner, a geotextile drainage layer, 30-inches of granular backfill, and a 6-inch loam and seed layer.

- In addition to the above, the wetland north of Willow Brook will be restored by providing a soil and wetland sediment cap consisting of 24 inches of granular fill, and 12-inches of wetland soil. The wetland will be planted with native wetland plants (refer to Drawing DET 3 of 9 in Appendix A of this document).

3.2.3 Site Restoration

Following the completion of the excavation and offsite disposal of contaminated soil and sediment, all areas disturbed by construction will be restored. The restoration of the waterway and wetland were previously described. It is anticipated that restoration activities for area outside the waterway and wetland will consist of the installation of paved parking areas or planting with native species. Planned final site restoration is presented in drawings SR 1 of 6 though SR 6 of 6 in Appendix A of this document.

Following restoration activities, UTC/P&W will implement two institutional controls to ensure the long-term protectiveness of the proposed remedy. The institutional controls consist of 1) a deed restriction to ensure the affected area will not be used for residential purposes and to prohibit excavation and 2) installation of a fence around the entire area to preclude access to

Willow Brook and Willow Brook Pond (refer to Drawings SR 1 of 6 though SR 6 of 6 in Appendix A of this document).

3.2.4 Record Keeping and Reporting

The following records will be maintained during construction to document the remedial activities:

- The delineation of the final horizontal and vertical limits of the soil and sediment removal activities;
- A photographic record of construction progress;
- Records of all quality assurance/quality control (QA/QC) testing performed;
- A record of all field screening and confirmatory sampling and analytical results, including sampling methods, locations and depths, frequency, and analytical results;
- Results of all waste disposal characterization samples of excavated materials;
- Results of all samples of treated effluent from the temporary on-site wastewater treatment system;
- A record of all daily activities; quantities of materials removed, generated, used and disposed of; and document manpower, material and equipment used;
- A record of all materials and equipment delivered to the site; and
- Copies of all hazardous waste manifests, non-hazardous waste bills of lading, and certificates of disposal for wastes generated during the project.

3.3 Post-Construction Activities

The following is a general description of the post-construction activities. It is anticipated that the post construction activities will include the preparation of a report documenting the remediation of the site and the implementation of a post-remediation groundwater-monitoring program.

3.3.1 Post-Remediation Reports

A post remediation report will be prepared for submission to the appropriate regulatory agencies. The report will contain a detailed description of remediation activities, confirmatory samples, offsite disposal documentation, appropriate figures and drawings, and analytical data tables presenting results of confirmatory samples. The report will be submitted to the CT DEP and EPA for review and ultimate approval. A separate report will be generated to satisfy the project

closeout reporting requirements of the wetlands restoration efforts. The project closeout report is a condition of a permit or approval issued by the Army Corps of Engineers and is described in greater detail in Attachment I of this document.

3.3.2 Post Remediation Groundwater Monitoring Program

Following completion of remedial activities, it will be necessary to perform post remediation groundwater monitoring of groundwater in the vicinity of Willow Brook and Willow Brook Pond. A Post-Remediation Groundwater Monitoring Program will be developed and submitted to the CT DEP and EPA review and comment. The Post-Remediation Groundwater Monitoring Program will specify groundwater monitoring wells to be sampled, field collection and analytical methods, quality assurance/quality control procedures, program duration, and reporting requirements. It is anticipated that post-remediation groundwater monitoring will be performed on a quarterly basis for a period of not less that two years.

4. WETLAND AND WATERCOURSE FUNCTIONS AND VALUES

4.1 Current Wetland and Watercourse Functions and Values

The project site is located in an urbanized area. The wetlands and watercourses at site of the proposed project have been highly altered through the years. The suite of functions and values that are present in the wetlands and watercourses at the site is not representative of natural wetlands. Certain specific values are provided, nonetheless. These values vary significantly across the site, due to the different physical, hydrological, and biological conditions present.

Willow Brook Channel- This area has been highly altered. The watercourse flows past steep banks in what is apparently a channelized condition. A riparian zone with flanking wetlands is largely absent. Due to the lack of native vegetation, this area is not expected to support significant populations of native wildlife. However, the dense stands of non-native vegetation may provide shelter for urban wildlife. The principal value of this section has been determined to be flow conveyance. This reach is also a sediment source to downstream areas and the Connecticut River.

Wetland- This area supports non-native invasive (Purple Loosestrife), native potentially invasive (Broad-leafed Cattail) and native vegetation (Black Gum, Cottonwood, Elderberry, willow herb, sedge, rushes, etc.). Despite partial invasion by Purple Loosestrife, it has the potential to support wetland dependent and wetland associated wildlife. The diffuse flow path and high organic content allows for water quality renovation. Although storage is not typically significant for flood prevention this far down in the watershed, there is a moderate amount of flood storage available. This could be significant if the narrow channel and culvert downstream are unable to pass storm flows.

4.2 Affect of Project on Wetland and Watercourse Functions and Values

The proposed remediation project will require removal of stream channel, pond bottom and marsh sediments, as well as all of the existing vegetation within the work area. The flow of Willow Brook will be conveyed past the site in a temporary channel. This will result in a short-term loss of most of the wetland and watercourse functions and values noted above. The exception is the flow conveyance function that will be provided in the temporary channel. It must be noted that these functions (especially with regard to biological functions) were typically of low value in this highly altered, urbanized setting.

The project includes a detailed channel, pond, and wetland restoration and enhancement plan. This will include removal of invasive species; provisions for creation of littoral shelves, flow

deflectors, and in-stream check dams. The long-term impact of this plan will be to restore the significant wetland resource, and enhance the ability of the stream channel and lower pond to provide aquatic and wetland fish and wildlife habitat and bank stabilization functions. The aesthetics and ecological integrity functions and values will also be enhanced. The long-term impact of the project will be positive on the wetland and watercourse resource values, while eliminating a potential source of PCB contamination and downstream sedimentation. The final result will be a restored pond and stream segment that has the ability to provide moderate level hydrologic, biologic, and aesthetic functions within an urban setting.

5. FISH AND WILDLIFE HABITATS AND POPULATIONS

5.1 Current Fish and Wildlife Habitats and Populations

As noted above, the site consists of a channelized stream reach, two impoundments, and a wetland partially invaded by Purple Loosestrife. The site environs and the Willow Brook watershed are largely urbanized. As such, fish and wildlife values are not typically considered to be high. Three habitat types were identified, stream, pond, and wet meadow/shallow marsh. All are considered degraded to highly degraded from a wildlife habitat perspective. Based on the surrounding landscape and a site inspection conducted on February 8, 2001, the following table identifies wildlife species likely to be present in the site environs.

White-tailed Deer	*Odocoilus virginianus*
Virginia Opossum	*Didelphis virginiana*
Muskrat	*Ondetra zibethicus*
Striped Skunk	*Mephisitis mephisitis*
Racoon	*Procyon lotor*
Eastern Chipmunk	*Tamies striatus*
Eastern Gray Squirrel	*Sciurus carolinensis*
Eastern cottontail	*Sylvilagus floridanus*
Norway Rat	*Rattus norvegicus*
Mice	*Peromyscus spp.*
Voles	*Microtus spp.*
American Toad	*Bufo americanus*
Bullfrog	*Rana catesbiana*
Garter Snake	*Thamnophis sittalis*
Green Frog	*Rana clamitans*
Painted Turtle	*Chrysemys picta*
American Goldfish	*Cardinelis tristis*
Northern Mockingbird	*Minus polyglottos*
Cardinal	*Cardinelis cardinelis*
Tufted Timouse	*Parus bicolor*
Blue Jay	*Cyanocita cristata*
American Robin	*Turdus migratorius*
Black-capped Chickodee	*parus attricapillus*
Common Grackle	*Quiscalus quiscula*
Flicker	*Coleptes auratus*
Mourning Dove	*Zenalda macroura*
Rock Dove	*Columb ilivia*
White-breasted Nuthatch	*Molotrhus ater*
House Sparrow	*Passer domesticus*
American Crow	*Corus brachy*rhynchos
Mallard	*Anas platyrhynchos*

Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
Eastern Phoebe	*Sayornis phoebe*
Red Winged Blackbird	*Agelaius phoeniceus*
European Starling	*Sturnus vulgaris*
Yellow Warbler	*Dendroica petechia*

As noted above, Willow Brook and the ponds have been highly altered. They also receive runoff from a highly urbanized watershed. Detailed fish surveys were not conducted as part of the assessment. However, the Connecticut Department of Environmental Protection has conducted electro fishing in the upper reaches of Willow Brook, upstream of the site. They reported low numbers of White Suckers and dace.

Based on a review of CT Natural Diversity Data Base maps, there are no known, extant populations of CT or U.S. listed Endangered, Threatened, or Special Concern flora or fauna at the site. There is a reported population or natural community approximately 2500' west of the site at the confluence of the Connecticut River and Willow Brook. The Natural Diversity Data Base has been contacted for more information.

5.2 Affect of Project on Fish and Wildlife Habitats and Populations

As noted above, the proposed remediation is anticipated to have a short-term negative impact on fish and wildlife habitat. However, the proposed project will result in the restoration of the wetlands and watercourses and significant improvements over the current fish and wildlife habitat within Willow Brook and Willow Brook Pond. Remediation of the PCB-contaminated sediments in the stream channel, pond and wetland will require removal of the vegetation and relocation of the stream, thereby eliminating any habitat in the short-term. The project plans also include restoration and enhancement of the stream channel, pond, and wetland.

Stream channel- The stream channel will be restored by first installing a stable channel lining of rip-rap. Due to the "flashy" nature of the hydrology in this urbanized area, a low flow channel will be created to provide for continuous aquatic habitat while maintaining the ability to pass required storm flows. Then coarse sand, gravel and cobbles will be placed in a 1' layer atop the rip-rap. Flow deflectors, boulders, and a cross-channel drop device will be installed to promote the development of a heterogeneous channel with riffles, a pool, and in-stream cover for fish. The channel upper side slopes will be constructed at a maximum 1.5h:1v slope due to horizontal space constraints. The slope will be stabilized with an open weave, permanent geotextile (Landlok TRM or equal), and topsoil and grass seed will be spread into the voids. Native trees and shrubs will be installed through the geotextile to provide wildlife habitat and shade along the

stream segment. All construction will be completed with on-site consultation by a biologist/wetland scientist. These plans are shown in more detail on drawings SR 1 of 7 through SR 7 of 7 and DET 1 of 9 through DET 9 of 9 in Appendix A of this application. A list of recommended plant materials is shown in Appendix A of this document.

Wetland- the existing wetland is presently degraded by the presence of the invasive plant, Purple Loosestrife (Lythrum salicaria). A major design criterion for the restored marsh was minimization of the potential for Purple Loosestrife re-invasion. Accordingly, the existing hydrology will be altered by setting the design elevation of the wetland floor below the water surface elevation, to prevent Purple Loosestrife seed set. The restored wetland will consist primarily of shallow marsh and deep marsh habitat, as opposed to the existing wet meadow/shallow marsh condition. The transition area on the north side of the wetland will be re-planted with wetland trees and shrubs. Specifications have been provided for an organic-enriched growth medium, whose source must be approved to minimize the potential for invasive plant importation. Commercially packaged peat from sedge, sphagnum, or reed sources is specifically prohibited as a topsoil amendment. If the topsoil conditions require organic soil amendments, clean leaf compost, which has been composted for a minimum of one year, shall be considered a reasonable alternative.

Large coarse woody debris (6"+ diameter) in various stages of decomposition (inspected to be free of invasive species) will also be placed in the restored wetland before it is re-flooded, to a maximum of 1% of the surface area of the marsh. All exposed soil above the final water surface elevation, not otherwise planted, will be seeded with a native wetland mix. At each stage of the final grading, growth medium placement, plant location and installation, the work will be reviewed by a qualified biologist/wetland scientist prior to proceeding to the next phase. The existing trees on the slope transition to the wetland will be preserved to the maximum extent feasible. Two wood duck boxes will be installed in the emergent wetland. An area of deeper water will also be excavated for waterfowl habitat. These plans are shown in more detail on SR 1 of 7 through SR 7 of 7 and DET 1 of 9 through DET 9 of 9 in Appendix A of this application. A list of proposed habitat/restoration plantings is provided in Appendix C and a list of potential substitute plant materials are provided in Appendix D of this document.

Pond- the existing Willow Brook Pond has limited values for aquatic habitat. The pond shoreline consists of sheet piling at the pond edge and lawn. Native, wildlife attractive shrubs and trees will be installed adjacent to the pond. At each stage of the final grading, growth medium placement, plant location and installation, the work will be reviewed by a qualified biologist/wetland scientist prior to proceeding to the next phase. The existing trees along the

north and south shores of the pond will be preserved to the maximum extent feasible. A Wood Duck box will be installed in the pond. These plans are shown in more detail on SR 1 of 7 through SR 7 of 7 and DET 1 of 9 through DET 9 of 9 in Appendix A of this application. A list of proposed habitat/restoration plantings is provided in Appendix C and a list of potential substitute plant materials are provided in Appendix D of this document.

Upper Pond- the existing small impoundment will be restored in a manner similar to the downstream Willow Brook Pond with the exception that geotextile-stabilized side slopes (1.5h:1v max. slope) and native trees and shrubs will be planted along the banks. This will provide for better maintenance of wildlife habitat across the entire site in comparison to what exists today. These plans are shown in more detail on SR 1 of 7 through SR 7 of 7 and DET 1 of 9 through DET 9 of 9 in Appendix A of this document. A list of proposed habitat/restoration plantings is provided in Appendix C and a list of potential substitute plant materials is provided in Appendix D of this document.

All construction will be completed while Willow Brook flows in a temporary channel. The work will require on-site consultation with a biologist/wetland scientist during each phase of the restoration process. Any substitutions or changes must be approved by the biologist/wetland scientist. The completed project will be monitored for a period of three (3) growing seasons after construction is complete. During this period, any necessary remedial actions will be identified and implemented as necessary. Reports will be filed with the permitting agencies on an annual basis. A final post construction assessment will be completed five years after project completion. Invasive species control will also be required during this period, which is also addressed during the implementation of the monitoring plan.

6. WATER QUALITY AND USES

The proposed project site is located in an urbanized area of the Town of East Hartford, Connecticut. The following is a discussion of the current water quality and water uses in the vicinity of the proposed project and the effect of the proposed project on water quality and uses.

6.1 Current Water Quality and Uses

The following discussion is based on published information available from the Department of Environmental Protection and is supplemented by information obtained by Loureiro Engineering Associates during the performance of subsurface investigations at and in the vicinity of the proposed project site. With regard to information available from the Department of Environmental Protection, the following information sources were referenced:

State of Connecticut
Department of Environmental Protection
Water Quality Standards
Effective April 12, 1996 and April 9, 1997

State of Connecticut
Atlas of Public Water Supply Sources and Drainage Basins of Connecticut
DEP Bulletin No. 4
June 1982

State of Connecticut
Water Quality Classifications
Connecticut River and South Central Coastal Basins
Sheet 2 of 3
Adopted February 1993

Current State Water Quality Standards and Designated Uses of Waters: From a review of the State of Connecticut Water Quality Classifications referenced above, groundwater in the vicinity of the proposed project site is classified as GB. The GB classification indicates groundwater within a historically highly urbanized area or an area of intense industrial activity and where public water supply service is available. Such ground water may not be suitable for human consumption without treatment due to waste discharges, spills or leaks of chemicals or land use impacts.

From a review of the State of Connecticut Water Quality Classifications referenced above, the surface water of Willow Brook and Willow Brook Pond in the vicinity of the proposed project site is classified as B. Designated uses for class B surface waters include recreational use; fish and wildlife habitat; agricultural and industrial supply and other legitimate uses including navigation.

Public Water Supplies and Private and Public Water Supply Wells: From a review of the Hartford North, Hartford South, Manchester, and Glastonbury quadrangle maps in the DEP Bulletin No. 4, there are no public or community water supply wells located within a one-mile radius of the proposed project site. From a review of information available from the Metropolitan District Commission, all properties immediately abutting the proposed project site are served with public water. Furthermore, from a review of information available from the Town of East Hartford, none of the properties that abut the proposed project site maintain a private drinking water supply well.

Wastewater Treatment Needs: Within the limits of the proposed project site, Willow Brook and Willow Brook Pond receive two point source discharges of wastewater from the United Technologies Corporation, Pratt & Whitney Division East Hartford main plant. Each discharge is permitted under the National Pollutant Discharge Elimination System.

Capacity of Waters to Assimilate Wastes: The 7-day 10-year recurrent low flow calculated for Willow Brook in the vicinity of the proposed project site is zero. Observations of base flow in Willow Brook at a point approximately 2,500 feet northeast of the proposed project site (Willow Brook crossing at Silver Lane) was performed by the Town of East Hartford. These observations indicated a base flow of approximately 0.75 cubic feet per second (485,000 gallons per day). As a result of the calculated and observed low flow in Willow Brook, it is concluded that Willow Brook and Willow Brook Pond have an insignificant capacity to assimilate wastes.

The wetland area located west of Willow Brook Pond and north of the open channel of Willow Brook does maintain a limited capacity as a wetland to assimilate waste.

Groundwater Recharge/Discharge: Loureiro Engineering Associates, Inc has performed subsurface investigations on, and in the vicinity of, the proposed project site. These investigations have resulted in the collection of data adequate to determine the hydrogeology of the proposed project site. In summary, groundwater flow is affected by the presence of Willow Brook Pond and the dam separating the lower reach of Willow Brook Pond and the upper reach of the open channel of Willow Brook (refer to Drawing ESC 3 of 8 through ESC 8 of 8 in Appendix A of this document). Upstream of the dam, Willow Brook Pond is a source of

recharge to underlying groundwater. Downstream of the dam, the underlying groundwater is a source of recharge to Willow Brook. Locally steep hydraulic gradients are present in the immediate vicinity of the dam between Willow Brook Pond and Willow Brook.

Groundwater Availability: Subsurface investigations performed by Loureiro Engineering Associates, Inc. indicate the average depth to groundwater in the vicinity of the proposed project site to be 12 to 15 feet below the ground surface. The investigations also indicate the presence of a silt and clay layer (lacustrine deposits) at a depth of approximately 15 to 25 feet below the ground surface in the immediately vicinity of the proposed project site. The thickness of the lacustrine clays and silts has been reported to exceed 270 feet beneath the United Technologies Corporation, Pratt & Whitney Division East Hartford facility. Due to the low transmissivity of these deposits, they are not considered suitable for use as a water supply source. These deposits are thickest in areas of deep bedrock valleys, one of which trends north/south and underlies the East Hartford main plant area, south of the proposed project site. The approximately 15 to 25 feet of glaciolacustrine sand and silt overlying the silt and clay layer is also not suitable for use as a water supply source.

Agriculture: As noted, the proposed project site is located in an urbanized area of the Town of East Hartford, Connecticut. As a result, no large-scale agricultural activity exists in the immediate vicinity of the proposed project site.

Water-based Recreation: Willow Brook is not used for water-based recreation in the immediate vicinity of the proposed project site.

6.2 Affect of Project on Water Quality and Uses

The following is a discussion of the effects of the proposed project activity on each of those aspects discussed in Section 6.1. As required, the following discussions present both the short-term and long-term effect of the proposed project activity.

Current State Water Quality Standards and Designated Uses of Waters: As noted in Section 6.1, groundwater north of the proposed project site has been classified as GA and groundwater to the south, east, and west has been classified as GB. The proposed project will have no short-term impact on groundwater quality in the vicinity of the project. It is likely that through the elimination of contaminated soil and sediment, the project will result in some improvement of groundwater quality. However, the predominant contaminant, PCBs, represent an insignificant groundwater contamination source in the vicinity of the proposed project.

As discussed above, Willow Brook and Willow Brook Pond are class B surface waters. As discussed in other sections of this document, Willow Brook and Willow Brook Pond will be temporarily diverted to allow for the remediation of contaminated soils and sediment. The diversion channel will be lined with a polyethylene liner to the elevation of the 100-year flood to eliminate the short-term effects associated with the transport of sediment to downstream reaches of Willow Brook. The proposed project will result in the restoration of the surface water bodies and wetlands and no long-term detrimental effects. The removal of contaminated sediments and the restoration of the stream channel, ponds, and wetlands with non-erosive surfaces will effectively eliminate the potential for downstream transport of contaminated sediment.

Public Water Supplies and Private and Public Water Supply Wells: As no public or private water supply wells exist in the immediate vicinity of the East Hartford main plant, the proposed project will have no short-term or long-term effect on these resources. In addition, the proposed project will have no short-term or long-term effect on existing public water supplies.

Wastewater Treatment Needs: The two point source discharges of wastewater from the United Technologies Corporation, Pratt & Whitney Division East Hartford main plant will be temporarily diverted to the diversion channel during the implementation of the proposed project. As the diversion channel will be lined and the points of entry to the diversion channel will be protected, there are no anticipated effects associated with the short-term diversion of these discharges. Following completion of the remediation project, the two discharges will be directed back to the Willow Brook and Willow Brook Pond. The proposed project will have no long-term effects on wastewater treatment needs.

Capacity of Waters to Assimilate Wastes: By diverting Willow Brook and Willow Brook Pond in a lined channel for the length of the proposed project site, groundwater recharge to the water within Willow Brook Pond will be eliminated for the duration of the diversion. However, as previously stated, Willow Brook and Willow Brook Pond have an insignificant capacity to assimilate wastes due to the low-flow within these water bodies. Upon restoration, the capacity of Willow Brook and Willow Brook Pond to assimilate waste will be effectively the same as exists today.

The diversion of Willow Brook and Willow Brook Pond and the excavation of contaminated sediments from within the wetland area will have a short-term impact of reducing the capacity of the wetland to assimilate waste. However, the wetland will be restored with high-organic soil and planted with native, non-invasive plant species. Following completion of the project, the wetland is expected to have at least the waste assimilation capacity that exists today.

Groundwater Recharge/Discharge: As noted above, the short-term effect of the project on groundwater discharge and recharge is associated with the installation of the lined diversion channel. The proposed project will result in the restoration of Willow Brook and Willow Brook Pond and will have no affect on the groundwater discharge and recharge patterns that exist in the vicinity of the proposed project site.

Groundwater Availability: The proposed project will not have any long-term or short-term impact on the availability of groundwater within the immediate vicinity of the proposed project site.

Agriculture: The proposed project will not have any long-term or short-term impact on agricultural activity in the immediate vicinity of the proposed project site.

Water-based Recreation: As Willow Brook is not used for water-based recreation in the immediate vicinity of the proposed project site, the proposed project will not have any long-term or short-term impact on water-based recreation in the immediate vicinity of the proposed project site.

7. MITIGATION MONITORING AND MAINTENANCE

This section presents a detailed protocol for the monitoring requirements associated with wetland restoration and enhancement at the project site. The mitigation plan and proposed plantings will inevitably require adjustment to site conditions, and this monitoring program includes consultation during construction. The mitigation monitoring also extends for three growing seasons after construction of the mitigation areas are complete. During this monitoring period, remedial actions may be necessary as directed by the biologist/wetland scientist, and could include, but are not limited to, replacement and/or substitution of plant materials, regrading, and nuisance vegetation removal. A final post construction assessment will be prepared five years after construction is complete.

The native plant materials in the mitigation area should require little if any long-term maintenance, once they are established. Significant pruning should not be required for aesthetic reasons. United Technologies Corporation, Pratt & Whitney Division will retain the right to remove invasive vegetation, and make any modifications required to prevent re-invasion, as directed by a biologist or wetland scientist. Nuisance vegetation in this regard refers to vegetation, (typically non-native), not incorporated into the original design, which has the potential to crowd out the desirable, installed vegetation.

This report includes a list of plants commonly used in landscaping that have the potential to invade mitigation sites. They are not to be used for aesthetic landscaping at the site.

Planting the mitigation areas will only use plant materials that are native and indigenous to the region (with the exception of *Salix purpurea, which will be used for bank stabilization in high energy areas*. Except where modified by any permit conditions herein, the mitigation shall be performed in accordance with the final plans approved to the DEP, US EPA, US Army Corps of Engineers, and the Town of East Hartford. To the extent practicable, all plantings shall be done in accordance with the plans referenced above. During planting, a qualified wetland scientist may relocate up to 50% of the planting cells, if the "as built" on-site conditions pose an unreasonable threat to the survival of the plantings. The planting cells shall be relocated to locations with suitable hydrology, soil and where appropriate structural context with other planting cells can be maintained. If a particular species is unavailable in the wetland nursery industry, a qualified biologist or wetland scientist shall specify an appropriate and similar substitute.

"Planting cells" means the discrete clusters of plants illustrated on the plans referenced above. If a species is not planted in discrete clusters, the planting cell may be considered to be the entire site.

7.1 Construction Phase Coordination

Coordination between the Wetland Scientist and the site contractor will begin at the pre-construction meeting, and include site inspections after rough grading is 50% and 100% complete, after final grading is complete, and at the time of plant installation. Prior to installation, the Wetland Scientist, in consultation with the engineer, will approve the final plant selection and location.

7.2 Monitoring

Monitoring activities must anticipate, identify, and correct factors that threaten permit compliance or jeopardize successful mitigation. Annual reports will summarize the significant monitoring events and provide other details for assessing the state of compliance and implementation of the wetland mitigation plans.

For each of the first five full growing seasons following construction of the mitigation site(s), the site(s) shall be monitored and monitoring reports shall be submitted to the Corps, Regulatory Division, Policy Analysis and Technical Support Branch, no later than December 15 of the year being monitored. Each report coversheet shall indicate the report number (Monitoring Report 1 of 5, for example). The reports shall answer the following success-standard questions and shall address in narrative format the items listed after the questions. The reports shall also include the four monitoring-report appendices listed below. The first year of monitoring shall be the first year that the site has been through a full growing season after completion of construction and planting. For these special conditions, a growing season starts no later than May 31. However, if there are problems that need to be addressed and if the measures to correct them require prior approval from the Corps, the permittee shall contact the Corps by phone (1-800-362-4367 in MA or 1-800-343-4789 in ME, VT, NH, CT, RI) or letter as soon as the need for corrective action is discovered.

Remedial measures shall be implemented to attain the four success standards described below within five growing seasons after completion of construction of the mitigation site(s). Measures requiring earth movement or changes in hydrology shall not be implemented without written approval from the Corps.

1. Does each mitigation site have at least 80% areal cover, excluding planned open water areas or planned bare soil areas (such as for turtle nesting), by noninvasive species? Do planned emergent areas on each mitigation site have at least 80% cover by noninvasive hydrophytes? For the purpose of this success standard, invasive species of hydrophytes are:

    - Cattails -- Typha latifolia, T. angustifolia, T. glauca;
    - Common Reed -- Phragmites australis;
    - Purple Loosestrife -- Lythrum salicaria; and
    - Reed Canary Grass -- Phalaris arundinacea
    - Buckthorn – Rhamnus frangula.

2. Are Common Reed (Phragmites australis) and/or Purple Loosestrife (Lythrum salicaria), plants at the mitigation site(s) being controlled?

3. Are all slopes, soils, substrates, and constructed features within and adjacent to the mitigation site(s) stabilized?

Items for narrative discussion:

Describe the monitoring inspections that occurred since the last report.

Concisely describe remedial actions done during the monitoring year to meet the four success standards – actions such as removing debris, replanting, controlling invasive plant species (with biological, herbicidal, or mechanical methods), regrading the site, applying additional topsoil or soil amendments, adjusting site hydrology, etc. Also describe any other remedial actions done at each site.

Report the status of all erosion control measures on the compensation site(s). Are they in place and functioning? If temporary measures are no longer needed, have they been removed?

Give visual estimates of (1) percent vegetative cover for each mitigation site and (2) percent cover of the invasive species listed under Success Standard No. 1, above, in each mitigation site.

What fish and wildlife use the site(s) and what do they use it for (nesting, feeding, shelter, etc.)?

By species planted, describe the general health and vigor of the surviving plants, the prognosis for their future survival and a diagnosis of the cause(s) of morbidity or mortality.

What remedial measures are recommended to achieve or maintain achievement of the four success standards and otherwise improve the extent to which the mitigation site(s) replace the functions and values lost because of project impacts?

MONITORING-REPORT APPENDICES:

Appendix A -- A copy of this permit's mitigation special conditions and summary of the mitigation goals.

Appendix B -- An as-built planting plan showing the location and extent of the designed plant community types (e.g., shrub swamp). Within each community type the plan shall show the species planted. This is only needed in the first monitoring report unless there are additional plantings of different species in subsequent years.

Appendix C – A vegetative species list of volunteer species in each plant community type. The volunteer species list should, at a minimum, include those that cover at least 5% of their vegetative layer.

Appendix D - Representative photographs of each mitigation site taken from the same locations for each monitoring event.

7.3 Assessment

A post-construction assessment shall be completed 5 years after construction is complete. The report should present conclusions and evidence relating to the overall success of the mitigation project. A basic premise of the assessment is that mitigation is "successful" if the designed features persist.

This assessment will consider the condition of the wetland mitigation areas after the first five full growing seasons following the completion of construction of the mitigation areas.

The post-construction assessment for this project shall include at least the following components:

1. Goals: Summarize the original or modified mitigation goals and discuss the level of attainment of these goals at each mitigation site.

2. Lessons Learned: A brief summary of any significant problems that were encountered or solutions that were developed during the construction and maintenance periods.

3. Recommendations: Provide recommendations to improve the efficiency, reduce the cost, or improve the effectiveness of similar projects in the future.

4. Appendices: Appendix A -- Summary of the results of a functions and values assessment of the mitigation areas, using the same methodology as was used to determine the functions and values for the impacted wetland(s); Appendix B -- A scaled drawing or overlay to the as-built plan illustrating the major vegetation community types; and Appendix C -- Photos of the mitigation site taken from the same fixed locations as the monitoring photos.

7.4 Special Conditions

1. This plan not to be used for construction without prior consultation with wetland scientist.

2. Final grading and planting plans to be based on additional observations of area hydrology.

3. All grading and planting to be completed in consultation with wetland scientist.

4. Growth medium (top soil) for wetland mitigation area to be inspected to determine its suitability and to determine that it is free of invasive species and approved by wetland scientist prior to application.

5. All disturbed wetland areas not otherwise planted shall be seeded with Blackledge Nursery wetland mix @ 1 pound per 3,000 square feet.

6. A pre-construction meeting between site contractor, planting contractor and wetland scientist shall be held prior to any activity in mitigation area.

7. Any vegetation retained to be tagged by wetland scientist.

8. Rough grading (50% and 100% complete) to be reviewed by wetland scientist prior to application of approved growth medium.

9. Final grading to be reviewed by wetland scientist prior to plant installation.

10. Plant materials, substitutions, and final plant locations to be reviewed by wetland scientist.

11. Mitigation area to be monitored by wetland scientist twice annually for three growing seasons post-construction as required by permits.

12. Nuisance vegetation control and/or other remedial measures to be implemented as directed by wetland scientist or permit agencies.

13. No invasive plants shall be included in the final planting plan for the project.

14. The wetland scientist shall review final construction documents.

15. A final, post construction assessment shall be prepared 5 years after completion of the mitigation area.

SOIL AMENDMENTS

Natural topsoil used for the restoration or enhancement of wetlands shall consist of at least 12% organic carbon content (by weight). Manmade topsoil used for the restoration or enhancement of wetlands shall consist of a blended matrix consisting of a mixture of equal volumes of clean 1-year compost and mineral soil (sandy loam or sand). All topsoil sources and soil amendment sources shall be inspected and determined to be free of invasive species prior to use.

Commercially packaged peat from sedge, sphagnum, or reed sources is specifically prohibited as a topsoil amendment. If the topsoil conditions require organic soil amendments, clean leaf compost that has been composted for a minimum of one year shall be considered a reasonable alternative with the approval of the wetland scientist.

At least 12 inches of natural or manmade topsoil shall be installed in all wetland mitigation areas, or more as specified in the plans.

EROSION CONTROLS

The current Best Management Practices as per CT Guidelines for Erosion and Sediment Control shall, at a minimum, be incorporated into the plans. All temporary erosion and sediment control devices and structures shall be disassembled and properly disposed of prior to 1 November three full growing seasons after planting (if the site is stable and mitigation

successful). Erodible sediment collected by these devices must also be removed and placed upland in a manner that will prevent its later erosion and transport to a waterway or wetland.

COARSE WOODY DEBRIS

To enhance habitat and avoid disruption of many specialized plant and animal cycles, an adequate supply (1% maximum area coverage) of dead and dying large woody debris (6"+ diameter) shall be left on the ground within the mitigation sites after the completion of construction of the mitigation sites. As much as possible, these materials should also be in various stages of decomposition and salvaged from natural areas cleared for the other elements of the project. The coarse woody debris shall not contain species on the attached invasive species list.

THE FOLLOWING SPECIES SHALL NOT BE INCLUDED IN THE PLANTING PLAN FOR THIS PROJECT

Latin Name	Common Name	Source
A. pseudoplatanus	Sycamore maple	ACOE
Acer platanoides	Norway maple	ACOE
Actinidia arguta	Kiwi vine	ACOE
Aegopodium podagraria	Goutweed or Bishop's weed	ACOE
Ailanthus altissima	Tree-of-heaven	ACOE/DEP
Alliaria petiolata	Garlic mustard	ACOE/DEP
Ampelopsis brevipedunculata	Porcelain berry	ACOE
Anthriscus sylvestris	Chervil	ACOE
B. vulgaris	Common barberry	ACOE
Berberis thunbergii	Japanese barberry	ACOE/DEP
Cabomba caroliniana	Fanwort	ACOE
Cardamine impatiens	Bushy rock-cress	ACOE
Catalpa speciosa	Western catalpa	ACOE
Celastrus orbiculatus Thunb.	Asiatic Oriental Bittersweet	ACOE/DEP
Centaurea biebersteinii	Spotted knapweed	ACOE
Centaurea maculosa Lam.	Spotted Knapweed	DEP
Coronilla varia	Crown vetch	ACOE
Cynanchum louiseae	Black swallow-wort	ACOE
E. umbellata	Autumn olive	ACOE
Echinochloa crusgalli	Barnyard grass	ACOE
Egeria densa	Giant waterweed	ACOE
Elaeagnus angustifolia	Russian olive	ACOE
Elaeagnus umbellata Thunb.	Autumn Olive	DEP
Epilobium hirsutum	Hairy willow-herb	ACOE
Euonymus alatus (Thunb.) Sieb.	Winged Euonymus	ACOE/DEP
Euphorbia cyparissias L.	Cypress Spurge	ACOE/DEP
F. ovina	Sheep fescue	ACOE

Festuca filiformia	Hair fescue	ACOE
Frangula alnus Mill.	European Buckthorn	DEP
Glaucium flavum	Sea- or horned poppy	ACOE
Glyceria maxima	Sweet reedgrass	ACOE
Hesperis matronalis L.	Dame's Rocket	ACOE/DEP
Humulus japonicus	Japanese hops	ACOE
Iris pseudacorus	Yellow iris	ACOE
Juniperus virginiana	Red cedar	ACOE
L. japonica	Japanese honeysuckle	ACOE
L. morrowii	Morrow's honeysuckle	ACOE
L. tartarica	Tatarian honeysuckle	ACOE
L. vulgare	Common hedge privet	ACOE
L. xbella	Morrow's X Tatarian honeysuckle	ACOE
L. xylosteum	European fly-honeysuckle	ACOE
Ligustrum obtusifolium	Japanese privet	ACOE
Lonicera japonica Thunb.	Japanese Honeysuckle	DEP
Lonicera maackii	Amur honeysuckle	ACOE
Lonicera morrowii A. Gray	Morrow's Honeysuckle	DEP
Lonicera x bella Zabel	Bella Honeysuckle	DEP
Lotus corniculatus	Birdsfoot trefoil	ACOE
Lysimachia nummularia	Moneywort	ACOE
Lythrum salicaria L.	Purple Loosestrife	ACOE/DEP
M. spicatum	Eurasian water-milfoil	ACOE
Morus alba	White mulberry	ACOE
Myosotis scorpioides	True forget-me-not	ACOE
Myriophyllum heterophyllum	Variable water-milfoil	ACOE
Najas minor	Lesser naiad	ACOE
Nasturtium officinale R. Br.	Watercress	DEP
Nymphoides peltata	Yellow floating heart	ACOE
P. cuspidatum	Japanese knotweed	ACOE
Phalaris arundinacea	Reed canary-grass	ACOE
Phragmites australis	Reed grass, Phragmites	ACOE
Phragmites australis (Cav.) Trin.	Common Reed	DEP
Poa compressa	Canada bluegrass	ACOE
Polygonum aubertii	Silver lace-vine	ACOE
Polygonum cuspidatum Sieb. & Zucc.	Japanese Knotweed	DEP

Populus alba	Silver poplar	ACOE
Potamogeton crispus L.	Crispy-leaved Pondweed	ACOE/DEP
Pueraria montana	Kudzu	ACOE
R. frangula	Glossy buckthorn	ACOE
R. rugosa	Japanese rose	ACOE
Ranunculus repens	Creeping buttercup	ACOE
Rhamnus cathartica	Common buckthorn	ACOE
Rhamnus cathartica L.	Buckthorn	DEP
Robinia pseudoacacia L.	Black Locust	ACOE/DEP
Rorippa nasturtium-aquaticum	Watercress	ACOE
Rosa multiflora Thunb.	Multiflora Rose	ACOE/DEP
Rumex acetosella	Sheep-sorrel	ACOE
Sedum telephium	Live-forever or Orpine	ACOE
Solanum dulcamara	Bittersweet nightshade	ACOE
T. angustifolia	Narrow-leaved cattail	ACOE
Thymus pulegioides	Wild thyme	ACOE
Trapa natans	Water-chestnut	ACOE
Tussilago farfara	Coltsfoot	ACOE
Typha latifolia	Common or Broad-leaved cattail	ACOE
Verbascum thapsus	Common mullein	ACOE
Vincetoxicum nigrum (L.) Moench.	Black Swallow-wort	DEP
Vincetoxicum rossicum (Kleo.) Barb.	Swallow-wort	DEP
Wisteria floribunda	Wisteria	ACOE

Notes:
Source as ACOE indicates plant is an Army Corps of Engineers published invasive species
Source as DEP indicates plant is a DEP published invasive species

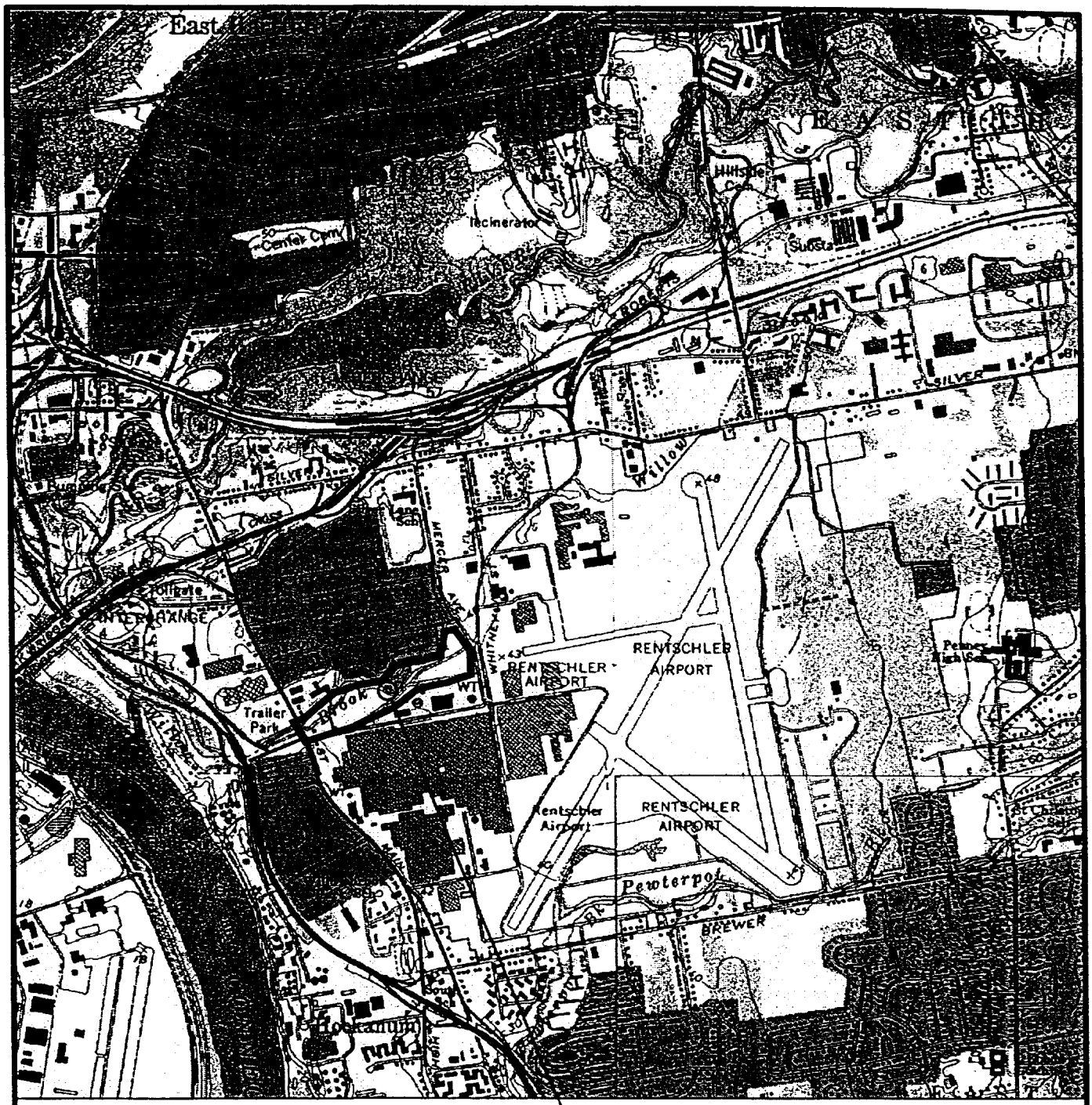
8. CONCLUSIONS

United Technologies Corporation, Pratt & Whitney Division is required to remediate PCB-contaminated soil and sediment in and adjacent to Willow Brook and Willow Brook Pond east of Main Street, in East Hartford, Connecticut. The project site contains a channelized stream segment, a 0.74-acre wetland, and two impoundments in Willow Brook. Willow Brook is culverted upstream and downstream of the site, and a stream segment within the site limit is contained in a 108-inch corrugated metal pipe. There is no alternative to removal of the stream bottom, wetland, and pond bottom sediments, in order to remediate unacceptable PCB concentrations. Restoration and enhancement of the stream channel, wetland, and pond are proposed to mitigate impacts to these resources.

The area presently provides low quality values for most wetland functions, including waste assimilation. The principal function is flow conveyance. The wetland area also has the potential to provide over bank storage in the lower reaches of this watershed. Existing fish and wildlife habitat values are considered minor, due to the highly altered landscape, limited available habitat, and high degree of urbanization of the area.

The proposed remediation plan will result in short term adverse impacts on low quality fish and wildlife habitat, wetlands, and watercourses. Given the highly altered nature of Willow Brook in this area, and the significant urbanization of the surrounding area, these impacts are considered to be minor in magnitude and short term in duration. A detailed plan has been developed for restoration and enhancement of the aquatic and wetland resources at the site. The long-term impact of the remediation plan will be positive with respect to wetlands, watercourses, and fish and wildlife habitat. In addition to complete restoration of the affected wetland, the proposed project will result in the establishment of a low flow stream channel or thalwag (presently absent), the removal of invasive species, and the establishment of riparian habitat and stream channel shading. The net result of the proposed project will be an enhanced pond, stream, and riparian zone.

Detailed restoration plans, notes, and details have been provided and will be implemented during construction of the project. This plan has been prepared to address the post-construction monitoring and maintenance activities that have been designed to ensure the success of the restoration and mitigation aspects of the project.



MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLES
FOR HARTFORD NORTH, HARTFORD SOUTH,
GLASTONBURY, AND MANCHESTER CONN.,
DATED 1964 & 1963 AND REVISED 1992.

WILLOW BROOK /
WILLOW BROOK POND LOCATION

1000 0 1000 2000 3000

SCALE IN FEET

N

ARMY CORPS OF ENGINEERS
MITIGATION PLAN
United Technologies Corp., Pratt & Whitney
WILLOW BROOK/WILLOW BROOK POND
USGS TOPOGRAPHIC MAP

Comm.No.
88UT002

FIGURE 2-1

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USGS.dwg

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APPENDIX A

Willow Brook/Willow Brook Pond
PCB Remediation Project
Project Drawings

Existing Site Conditions

1. Drainage Area Map
2. Vicinity Map
3. Overall Sheet Layout
4. Existing Site Conditions-sheet 1
5. Existing Site Conditions-sheet-2
6. Existing Site Conditions-sheet-3
7. Existing Site Conditions-sheet-4
8. Existing Site Conditions-sheet-5

Site Preparation

1. Overall Sheet Layout
2. Site preparation - sheet 1
3. Site preparation - sheet 2
4. Site preparation - sheet 3
5. Site preparation - sheet 4
6. Site preparation - sheet 5

By-Pass Channel

1. Overall Sheet Layout
2. Sta 0 + 00 to Sta 7 + 00
3. Sta 6 + 00 to Sta 11 + 75
4. Sta 8 + 50 to Sta 18 + 50
5. Sta 14 + 50 to Sta 22 + 00
6. Sta 20 + 20 to Sta 22 + 00

Channel Improvements

1. Overall Sheet Layout
2. Channel Improvements Sheet 1
3. Channel Improvements Sheet 2

Excavation Areas

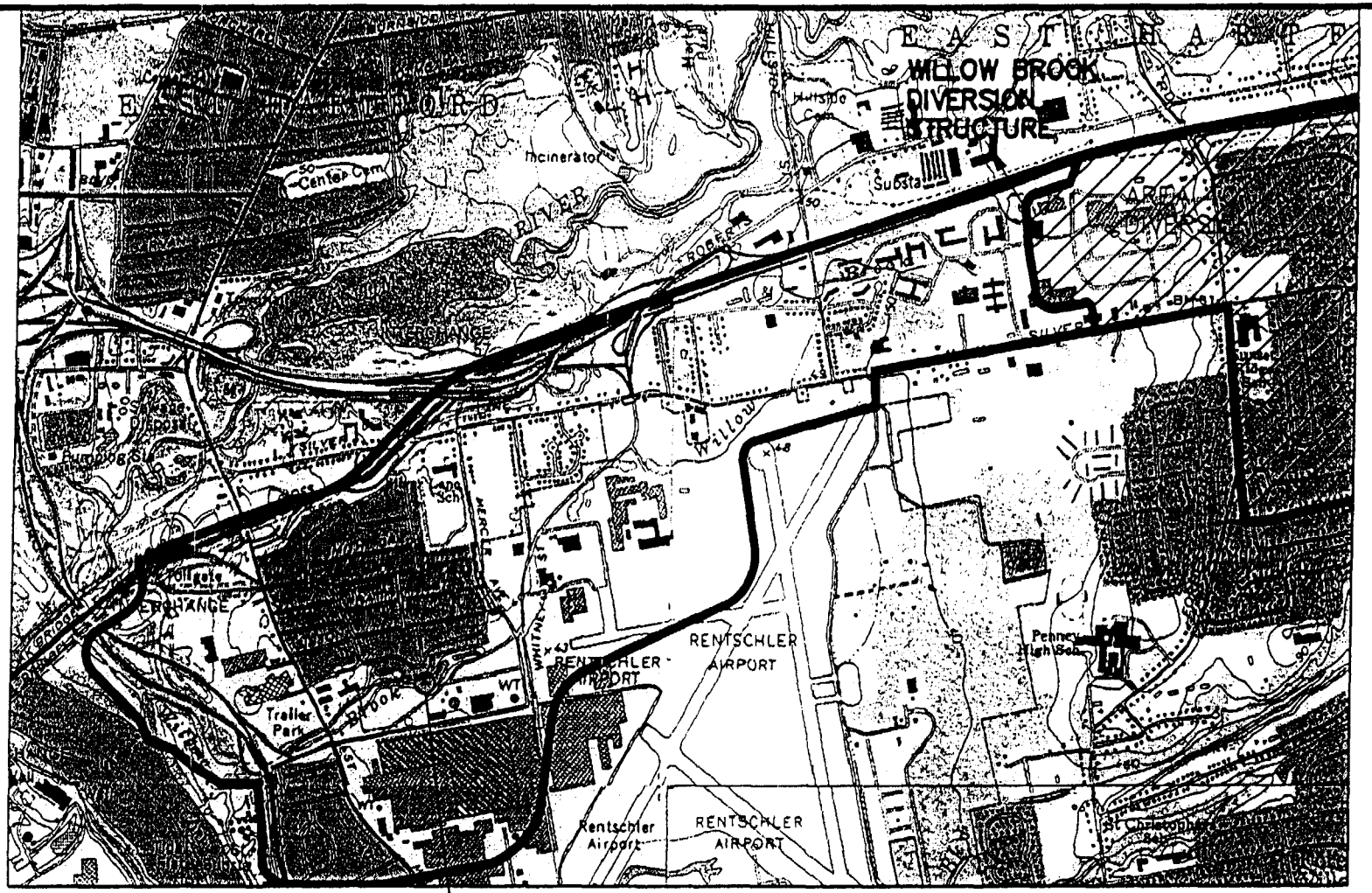
1. Overall Sheet Layout
2. Excavation Areas-sheet 1
3. Excavation Areas-sheet 2
4. Excavation Areas-sheet 3
5. Excavation Areas-sheet 4
6. Excavation Areas-sheet 5

Site Restorations

1. Construction Notes
2. Overall Sheet Layout
3. Site Restoration - sheet 1
4. Site Restoration - sheet 2
5. Site Restoration - sheet 3
6. Site Restoration - sheet 4
7. Site Restoration - sheet 5

Details

1. Stream Channel Cap
2. Pond Bottom Cap
3. Wetland Restoration
4. Engineered Control
5. Chain link Fence
6. Erosion Controls
7. Culvert Transition at By-pass Channel
8. By-Pass Channel
9. By-Pass Channel Energy Dissipater

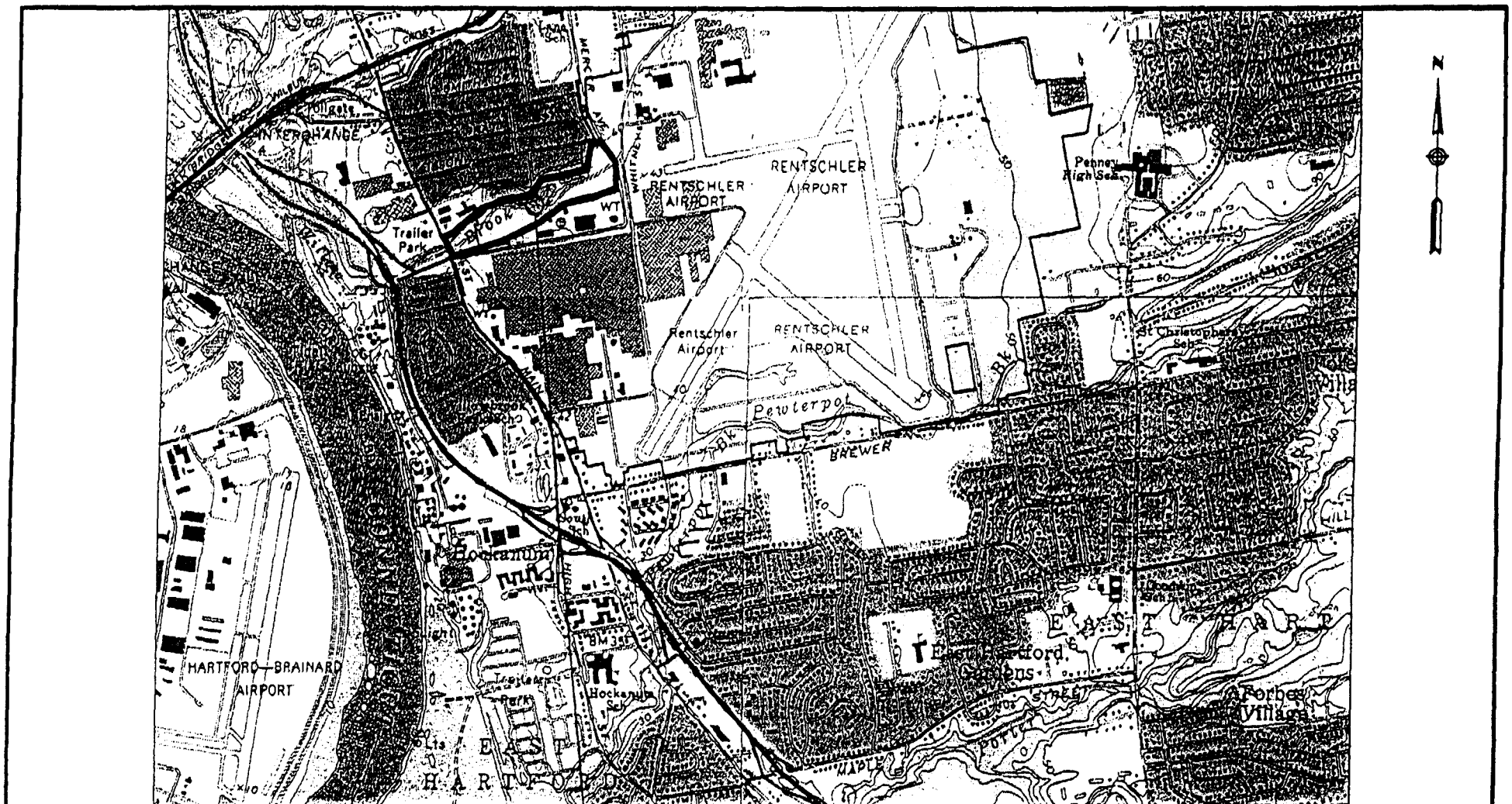


MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLES
FOR HARTFORD NORTH, HARTFORD SOUTH,
GLASTONBURY, AND MANCHESTER CONN.,
DATED 1964 & 1963 AND REVISED 1992.

WILLOW BROOK /
WILLOW BROOK POND LOCATION

1000 0 1000 2000 3000
SCALE IN FEET

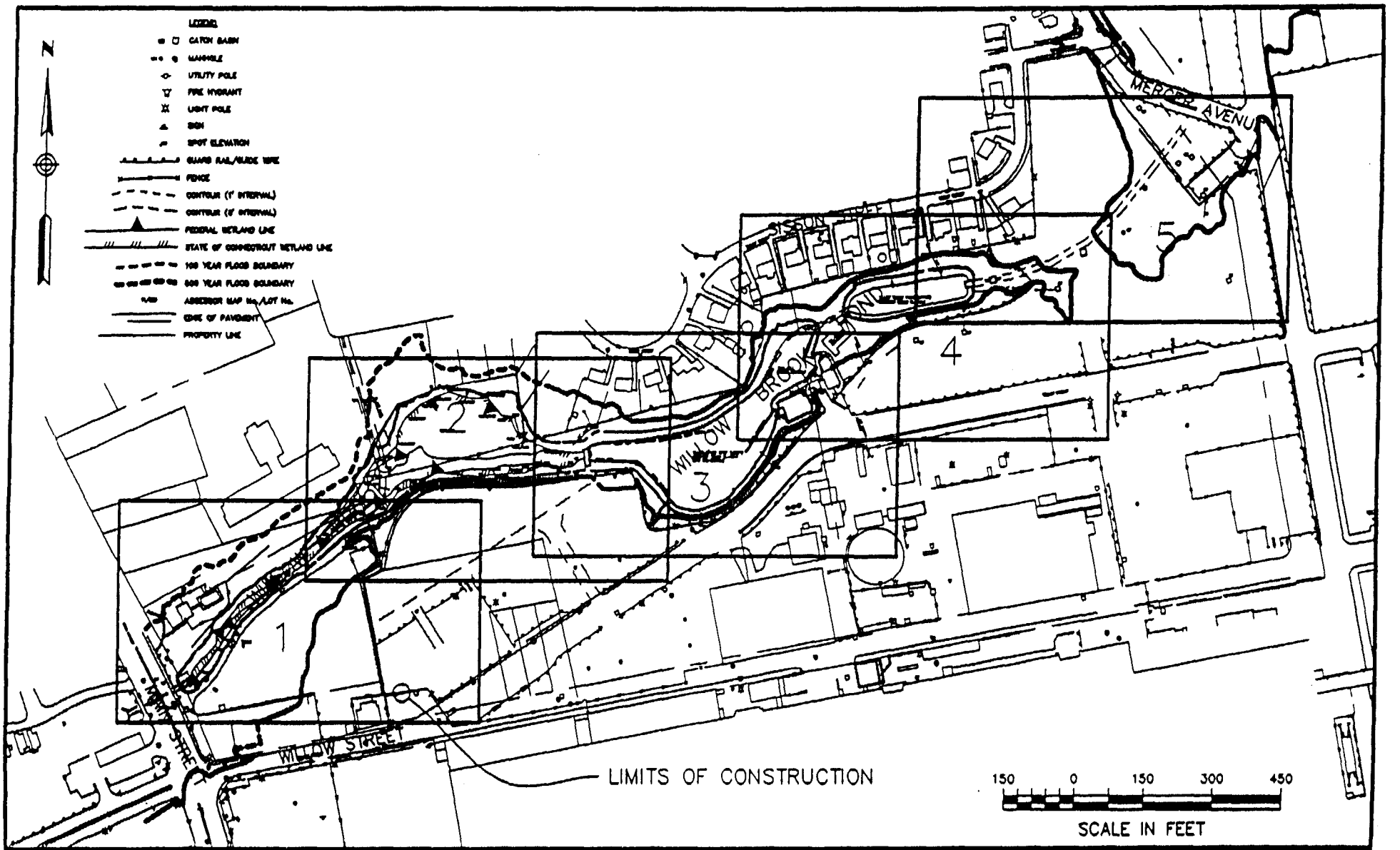
Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	EXISTING SITE CONDITIONS DRAINAGE AREA MAP	Feb. 14, 2001
Loureiro Engineering Associates, Inc. 100 Northwest Drive, Plainville, Conn. 06062 An Employee Owned Company 860-747-6181	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND MAIN STREET, EAST HARTFORD, HARTFORD COUNTY, CONNECTICUT	ESC 1 of 8



MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLES
FOR HARTFORD NORTH, HARTFORD SOUTH,
GLASTONBURY, AND MANCHESTER CONN.,
DATED 1964 & 1963 AND REVISED 1992.

WILLOW BROOK /
WILLOW BROOK POND LOCATION

Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	EXISTING SITE CONDITIONS VICINITY MAP	Feb. 14, 2001
Loureiro Engineering Associates, Inc. 100 Northwest Drive, Plainville, Conn. 06062	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	ESC 2 of 8



Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

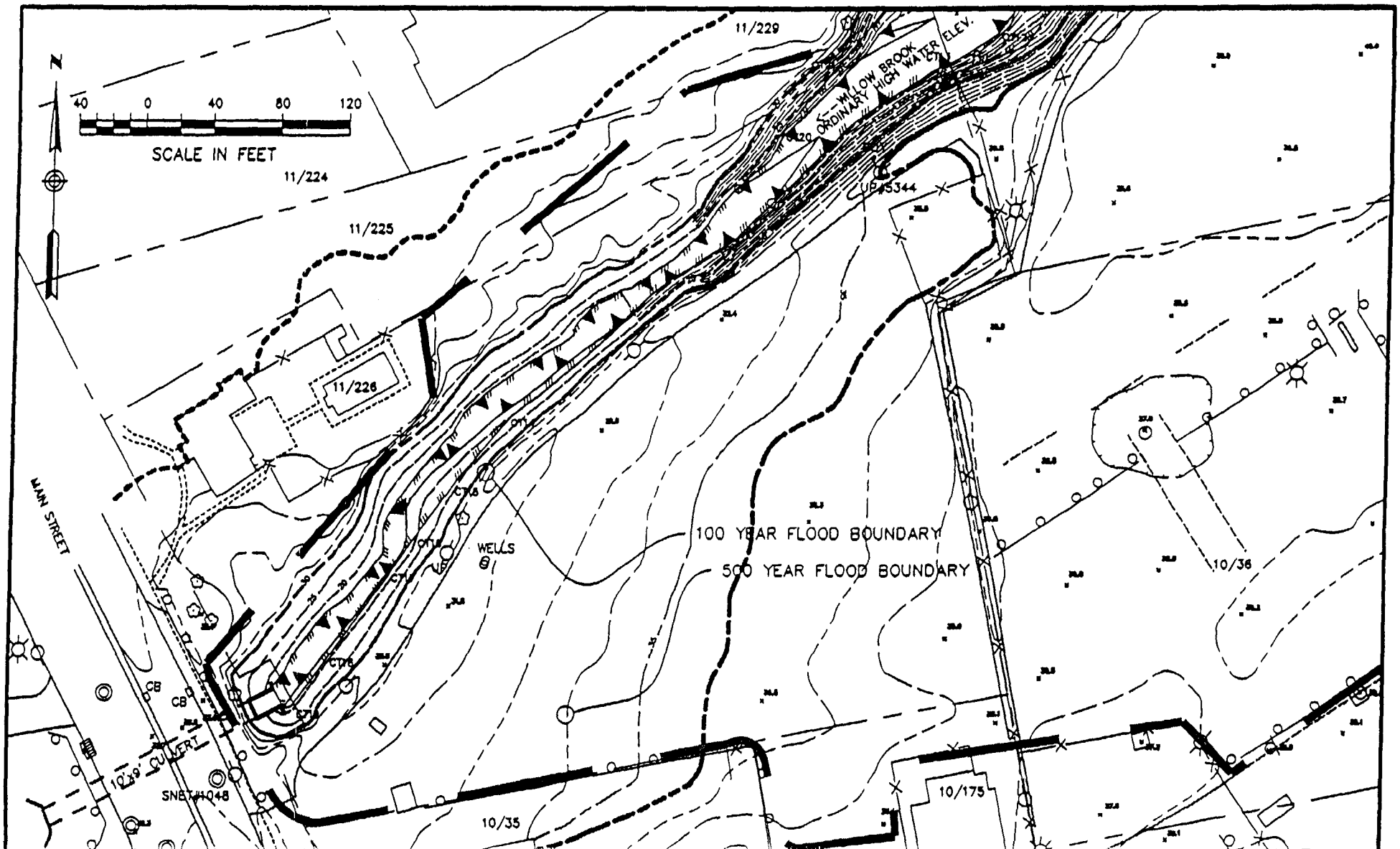
EXISTING SITE CONDITIONS
OVERALL SHEET LAYOUT

Feb. 14, 2001

Loureiro Engineering Associates, Inc.
100 Northwest Drive, Plainville, Conn. 06062

Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND

ESC 3 OF 8



Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

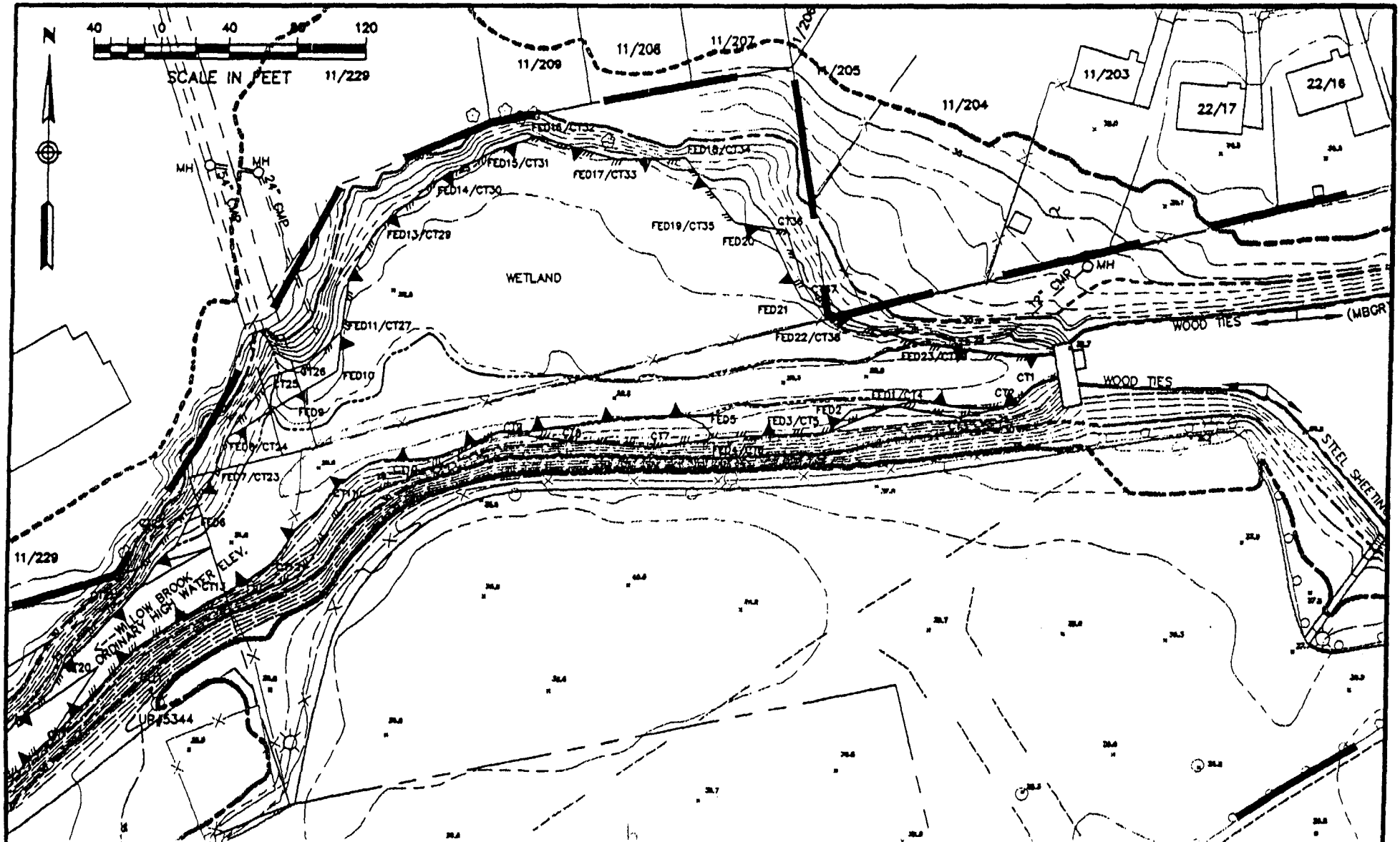
EXISTING SITE CONDITIONS
SHEET 1

Feb. 14, 2001

Loureiro Engineering Associates, Inc.
100 Northwest Drive, Plainville, Conn. 06062
An Employee Owned Company 860-747-6181

Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND
MAIN STREET, EAST HARTFORD, HARTFORD COUNTY, CONNECTICUT

SITE-EXIST.dwg



Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

Loureiro Engineering Associates, Inc.

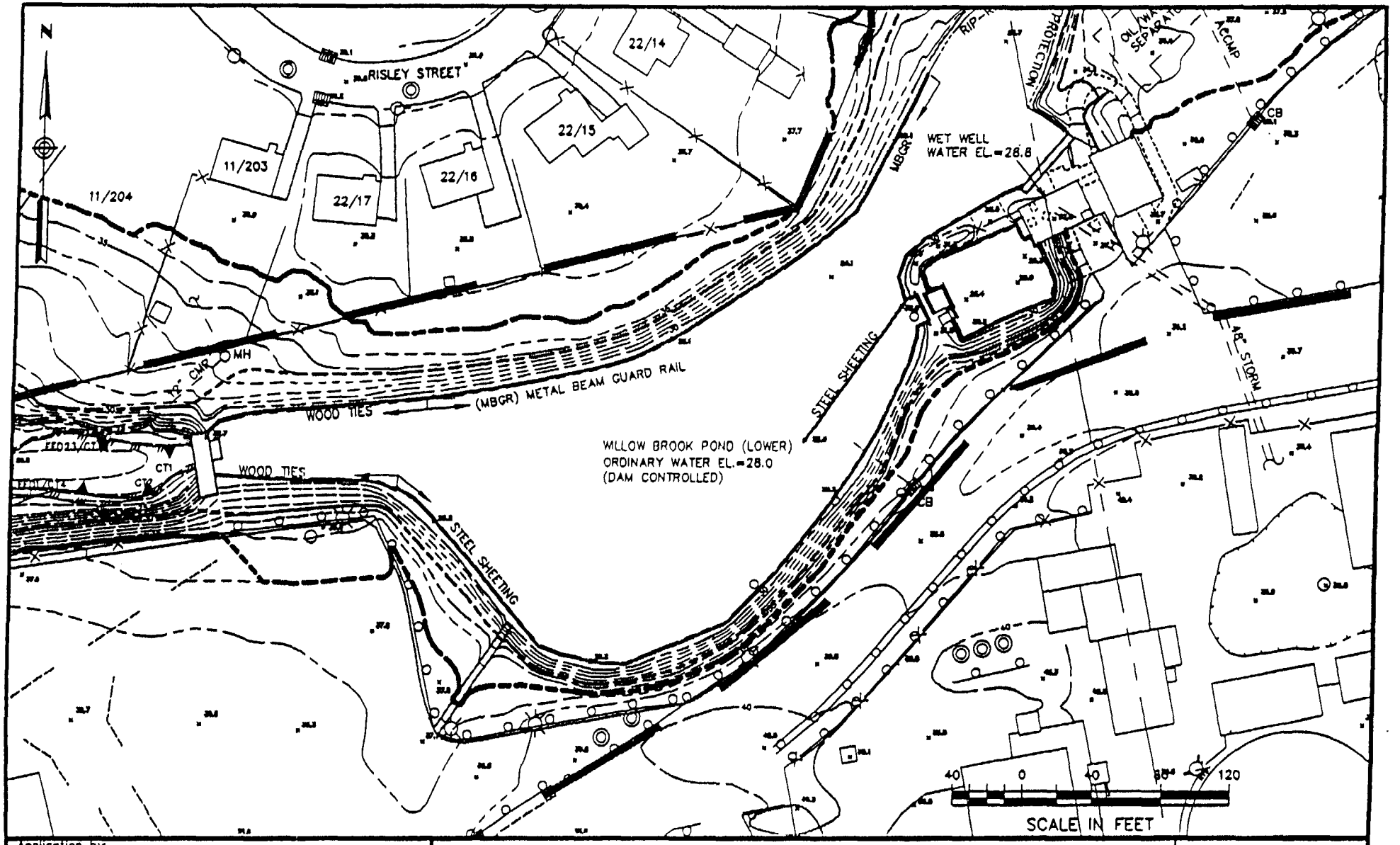
EXISTING SITE CONDITIONS
SHEET 2

Feb. 14, 2001

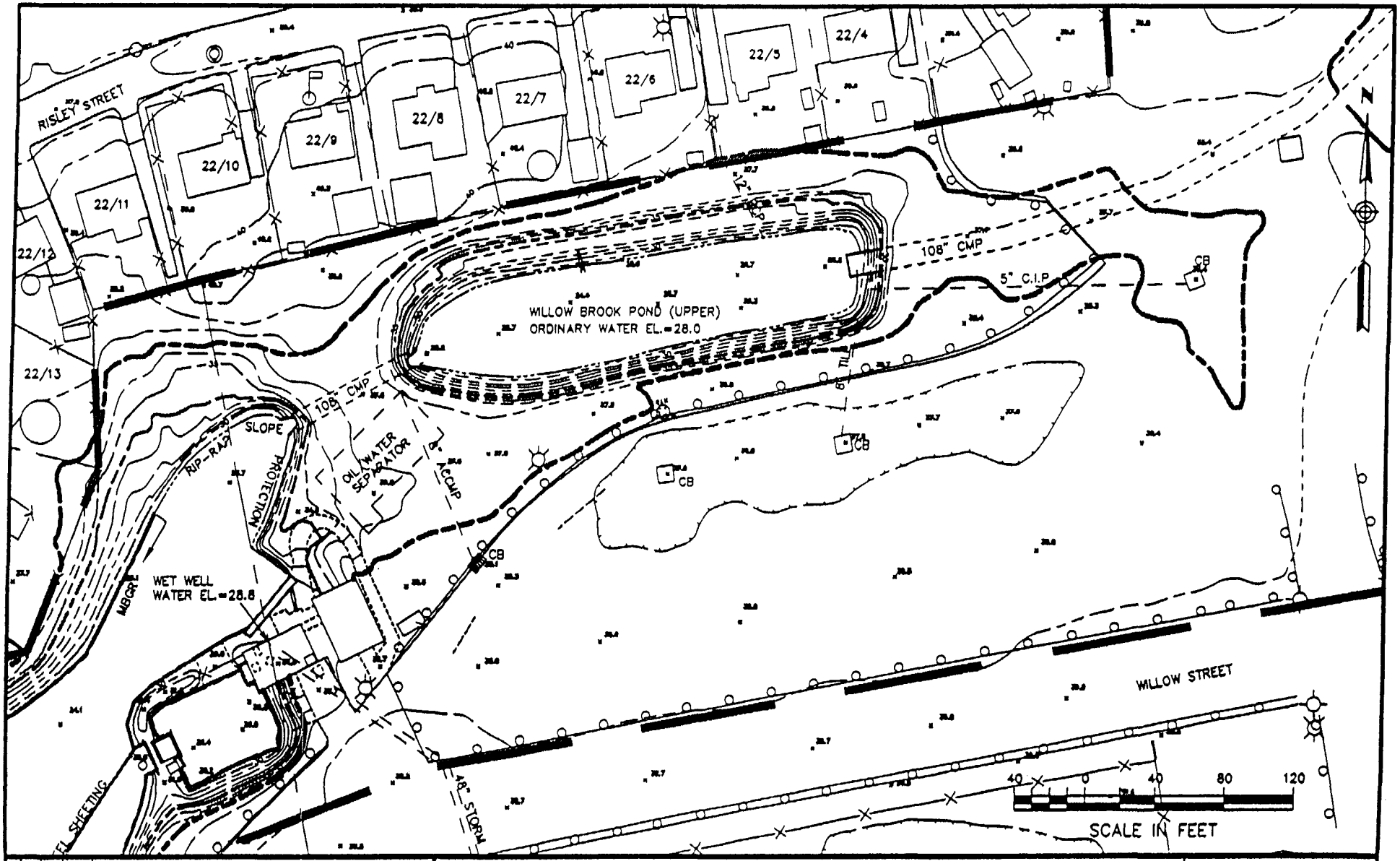
Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND

ESC 5 of 8

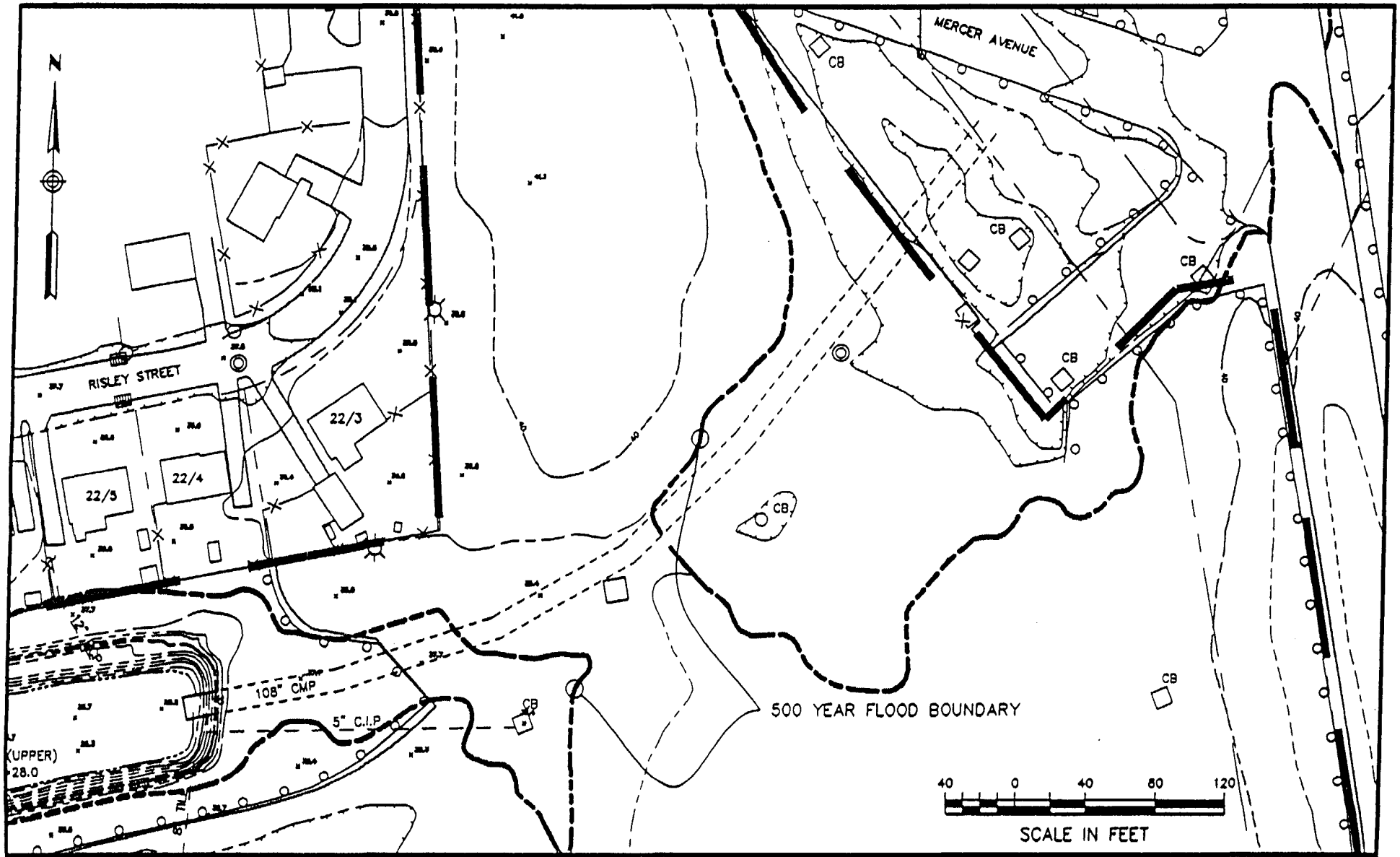
ESC-1SHT-dwg



Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	EXISTING SITE CONDITIONS SHEET 3	Feb. 14, 2001
Loureiro Engineering Associates, Inc. 100 Northwest Drive, Plainville, Conn. 06062	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	ESC 6 of 8



Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	EXISTING SITE CONDITIONS SHEET 4	Feb. 14, 2001
Loureiro Engineering Associates, Inc. 100 Northwest Drive, Plainville, Conn. 06062	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	ESC 7 of 8



Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

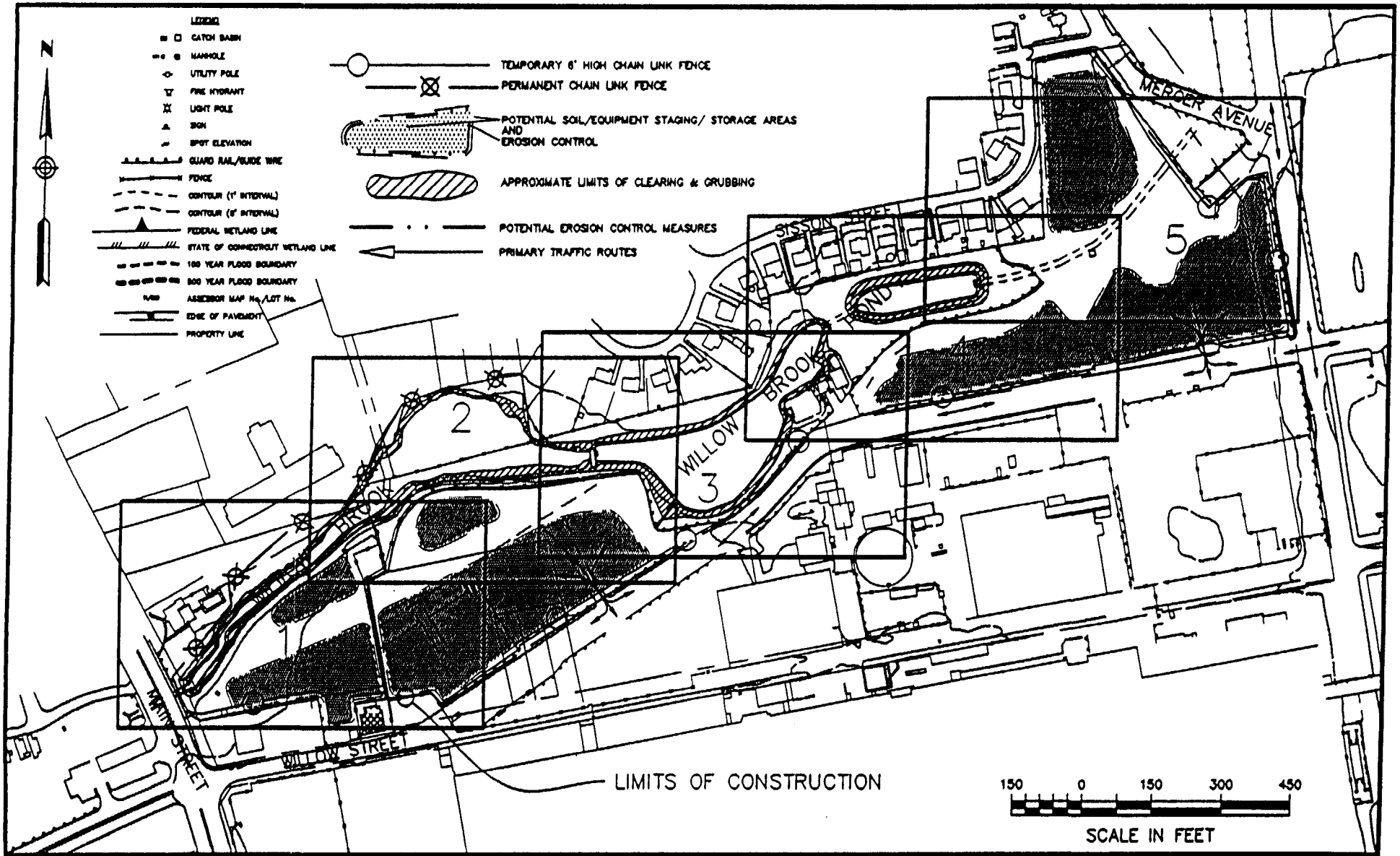
EXISTING SITE CONDITIONS
SHEET 5

Feb. 14, 2001

Loureiro Engineering Associates, Inc.
100 Northwest Drive, Plainville, Conn. 06062

Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND

ESC 8 of 8



Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

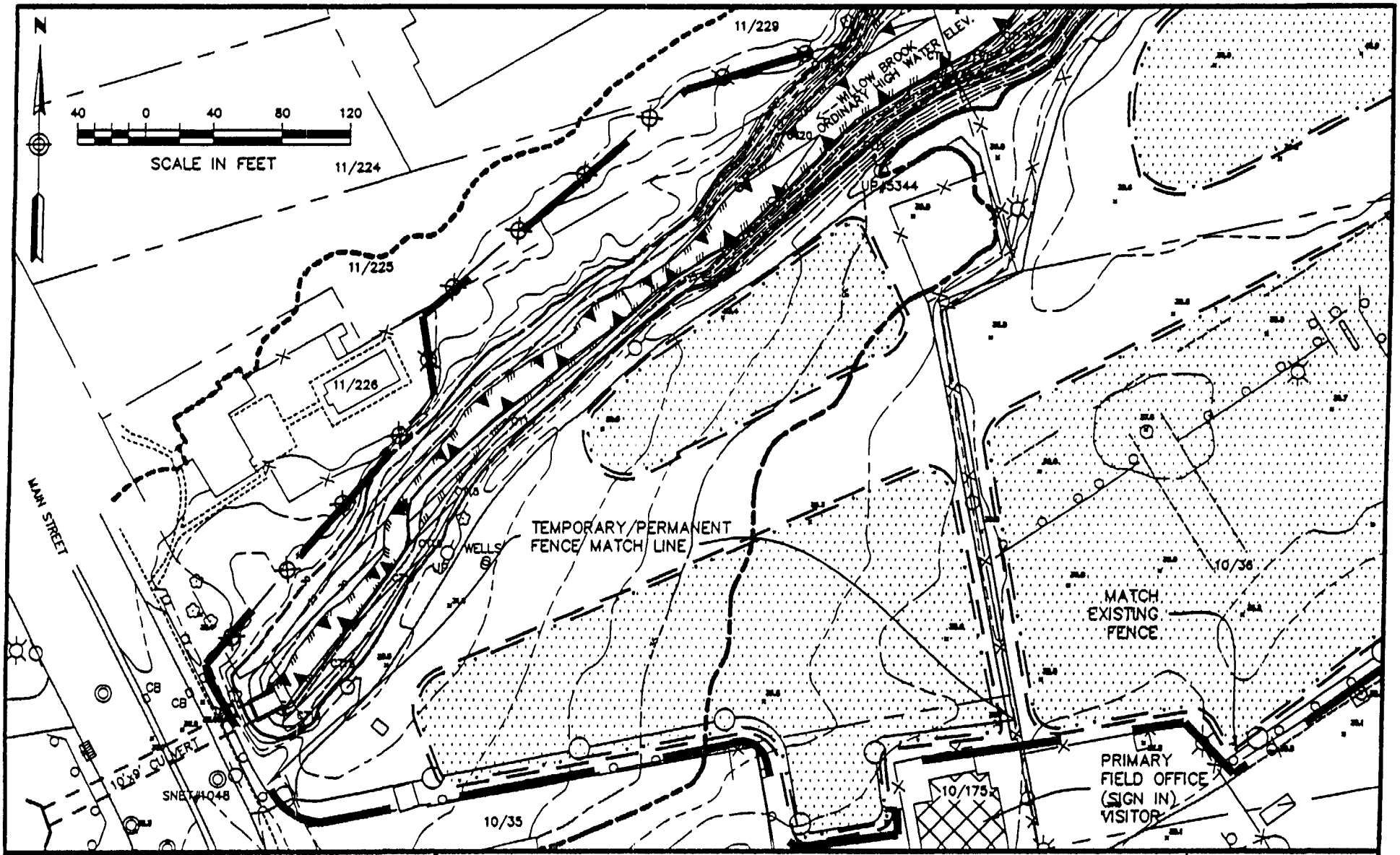
SITE PREPARATION
OVERALL SHEET LAYOUT

Feb. 14, 2001

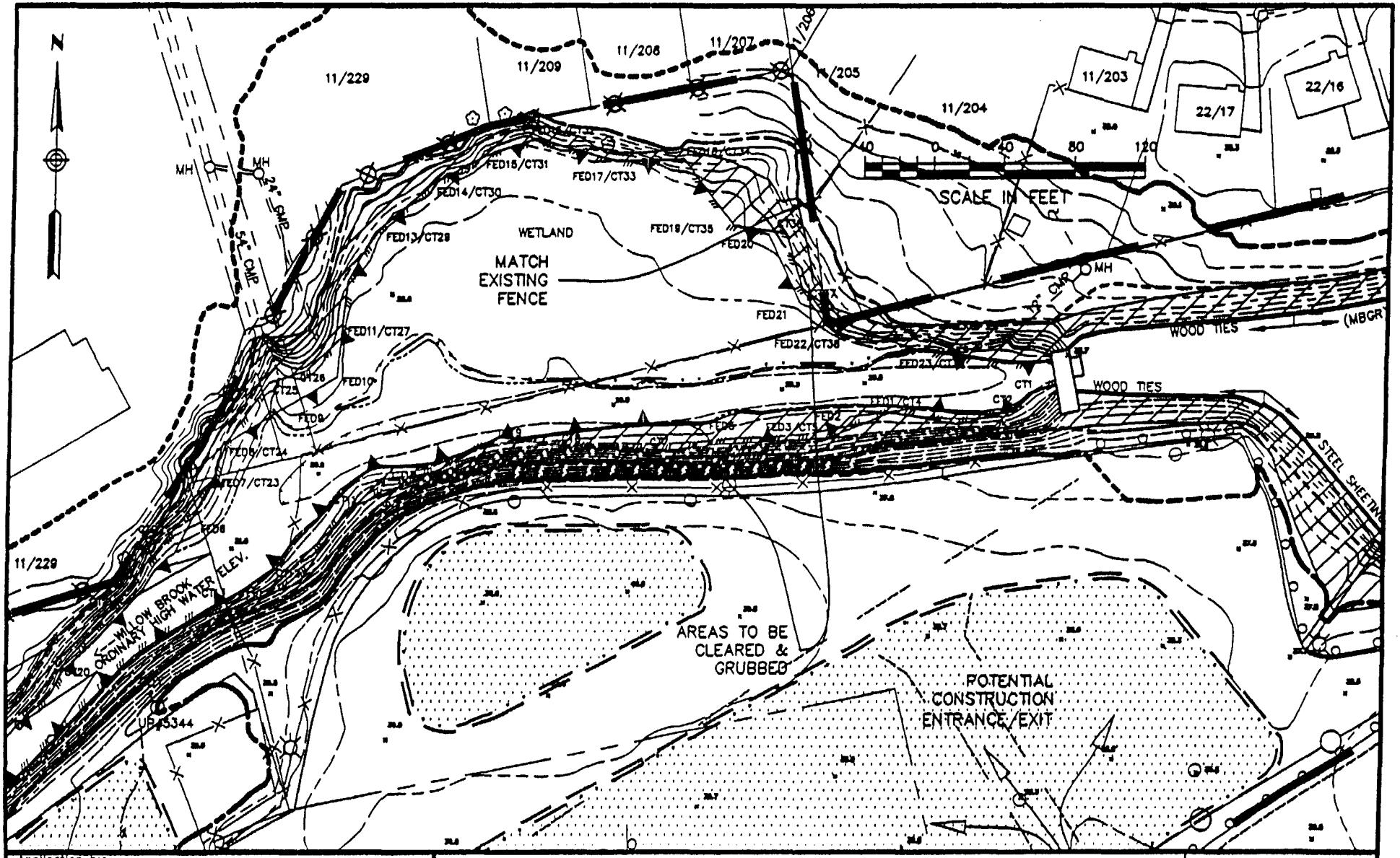
Loureiro Engineering Associates, Inc.
100 Northwest Drive, Plainville, Conn. 06062

Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND

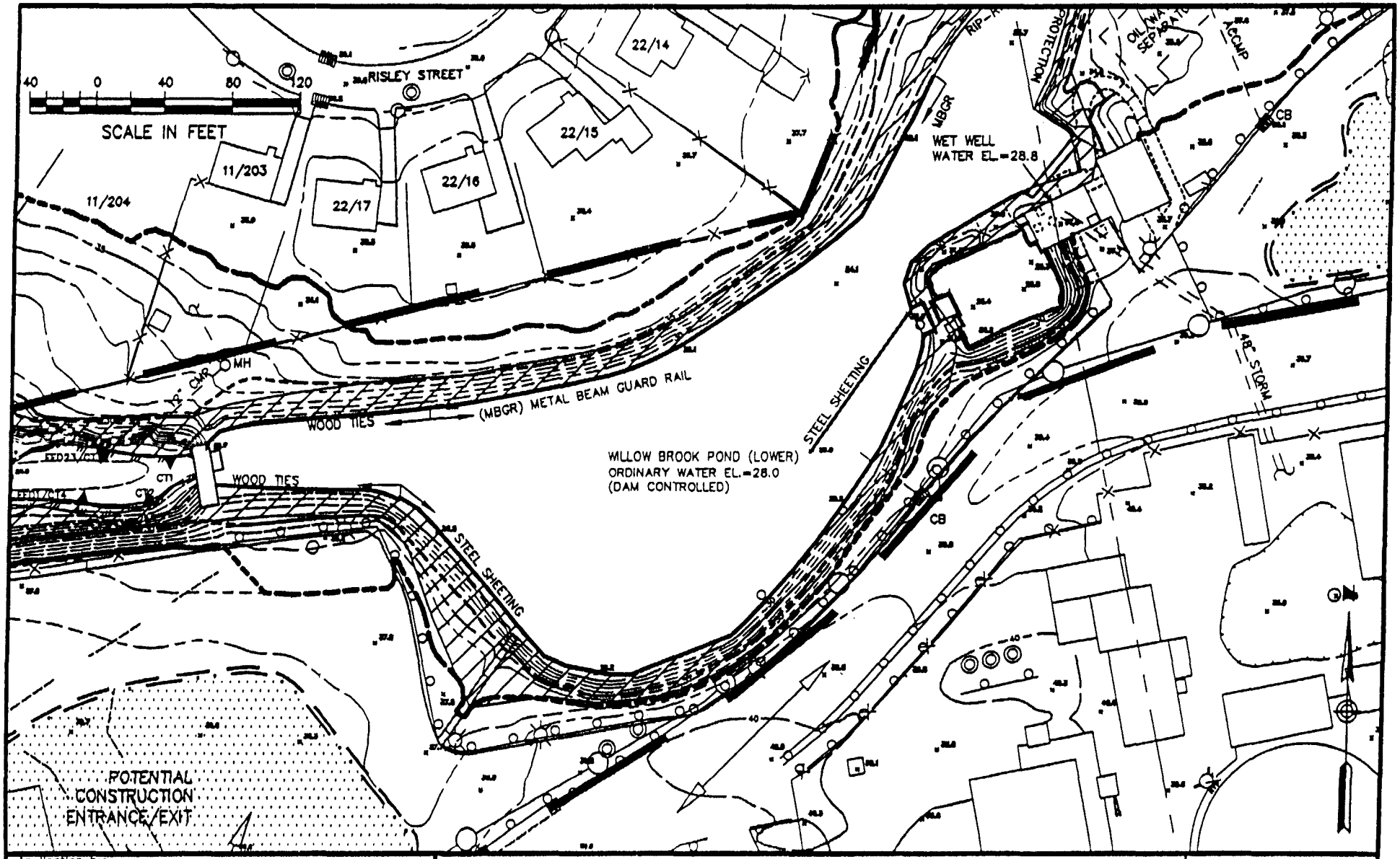
SP 1 OF 6



Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	SITE PREPARATION SHEET 1	Feb. 14, 2001
Loureiro Engineering Associates, Inc. 100 Northwest Drive, Plainville, Conn. 06062	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	SP 2 of 6



Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	SITE PREPARATION SHEET 2	Feb. 14, 2001
Loureiro Engineering Associates, Inc.	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	SP 3 of 6



Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

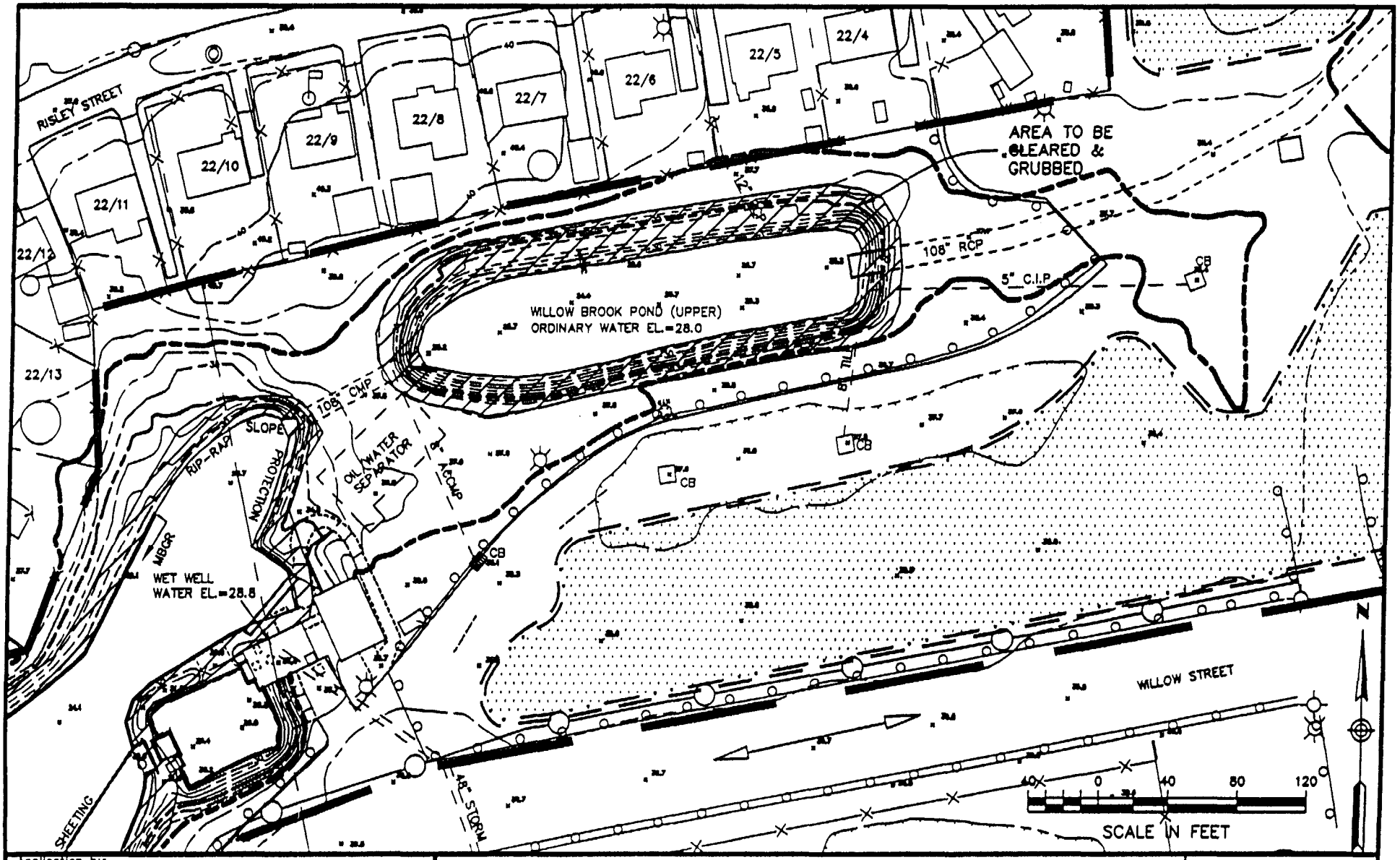
SITE PREPARATION
SHEET 3

Feb. 14, 2001

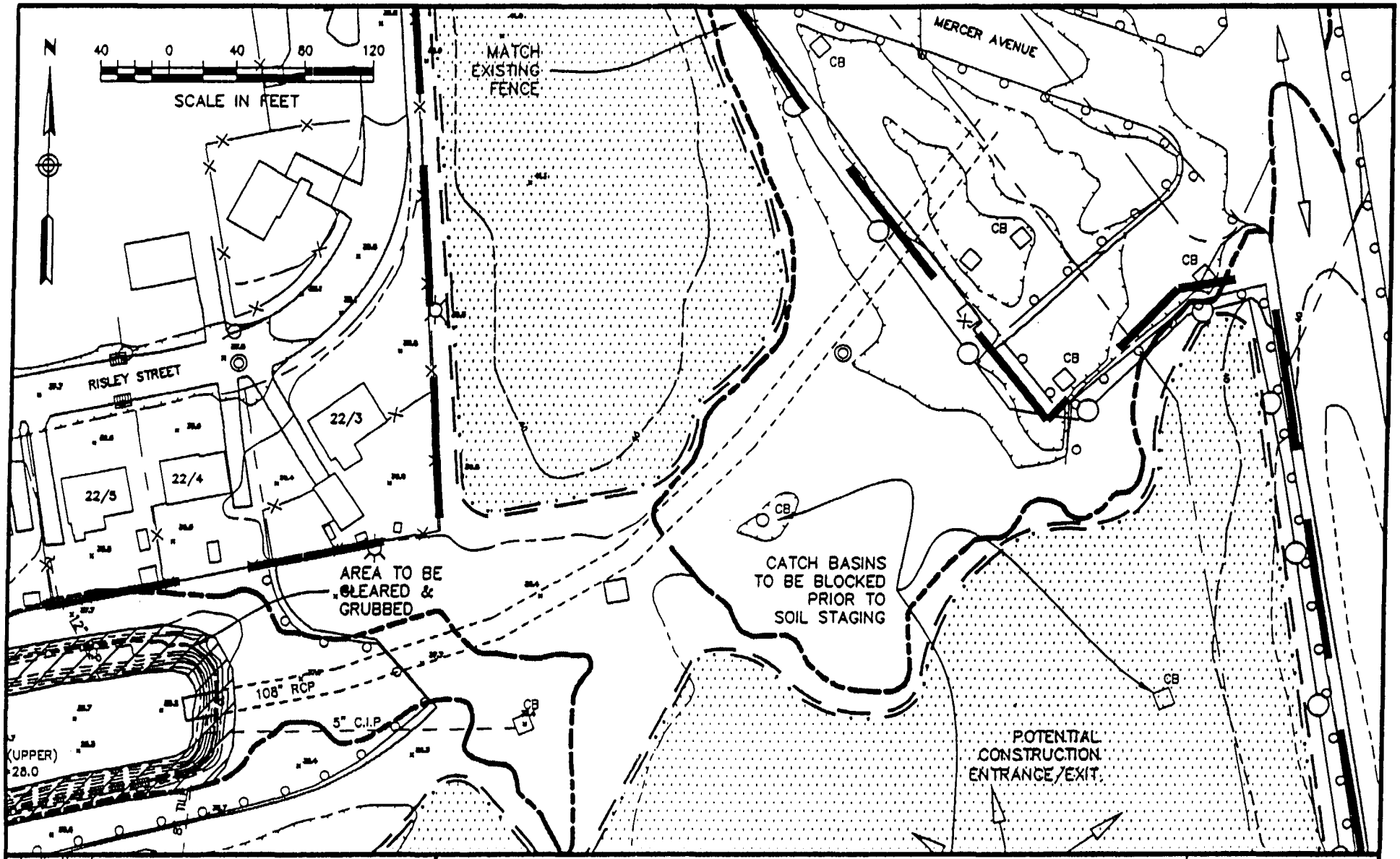
Loureiro Engineering Associates, Inc.

Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND

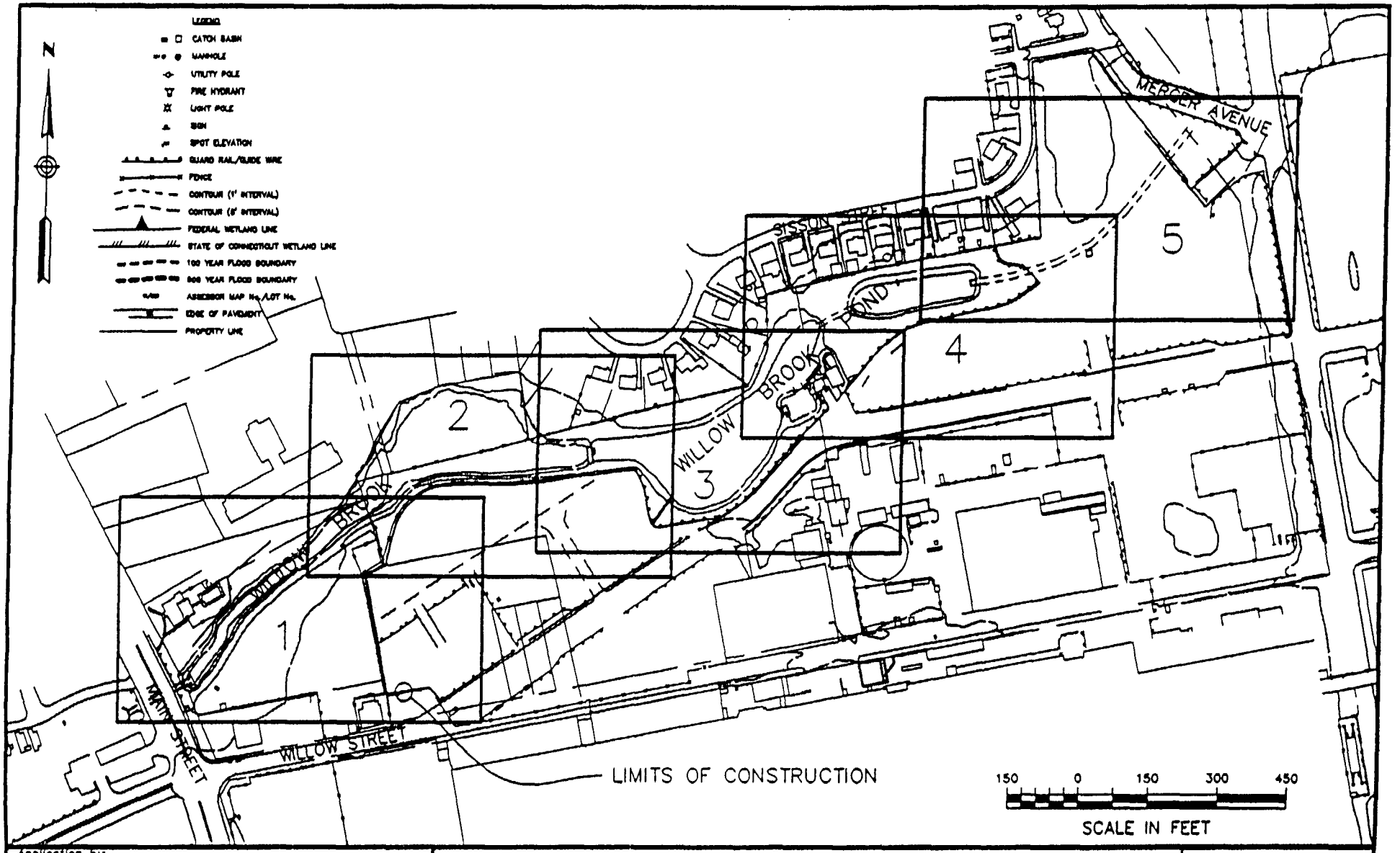
SP 4 of 6



Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	SITE PREPARATION SHEET 4	Feb. 14, 2001
Loureiro Engineering Associates, Inc. 100 Northwest Drive, Plainville, Conn. 06062	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	SP 5 of 6



Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	SITE PREPARATION SHEET 5	Feb. 14, 2001
Loureiro Engineering Associates, Inc. 100 Northwest Drive, Plainville, Conn. 06062	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	SP 6 of 6



Application by:

UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

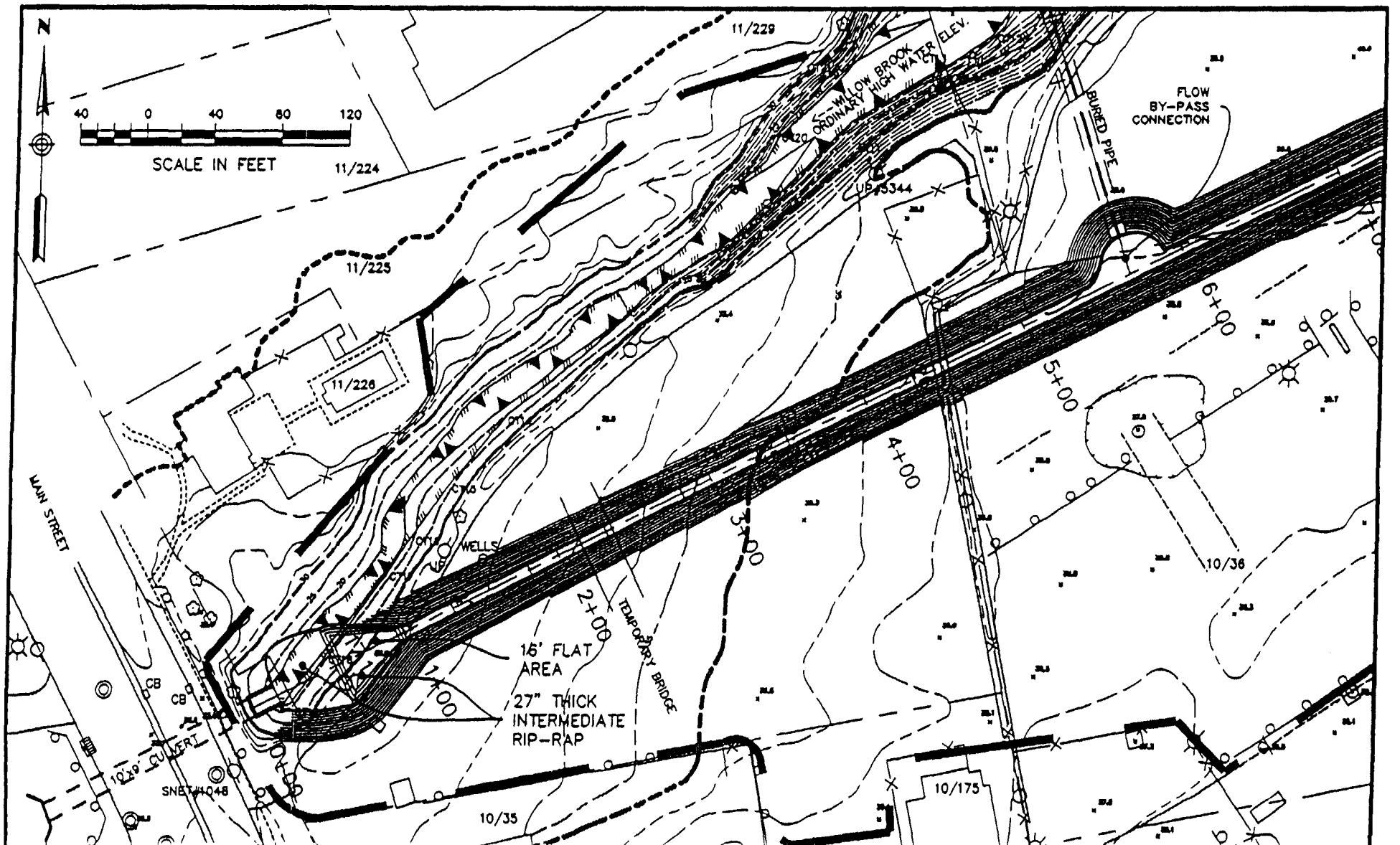
BY-PASS CHANNEL
OVERALL SHEET LAYOUT

Feb. 14, 2001

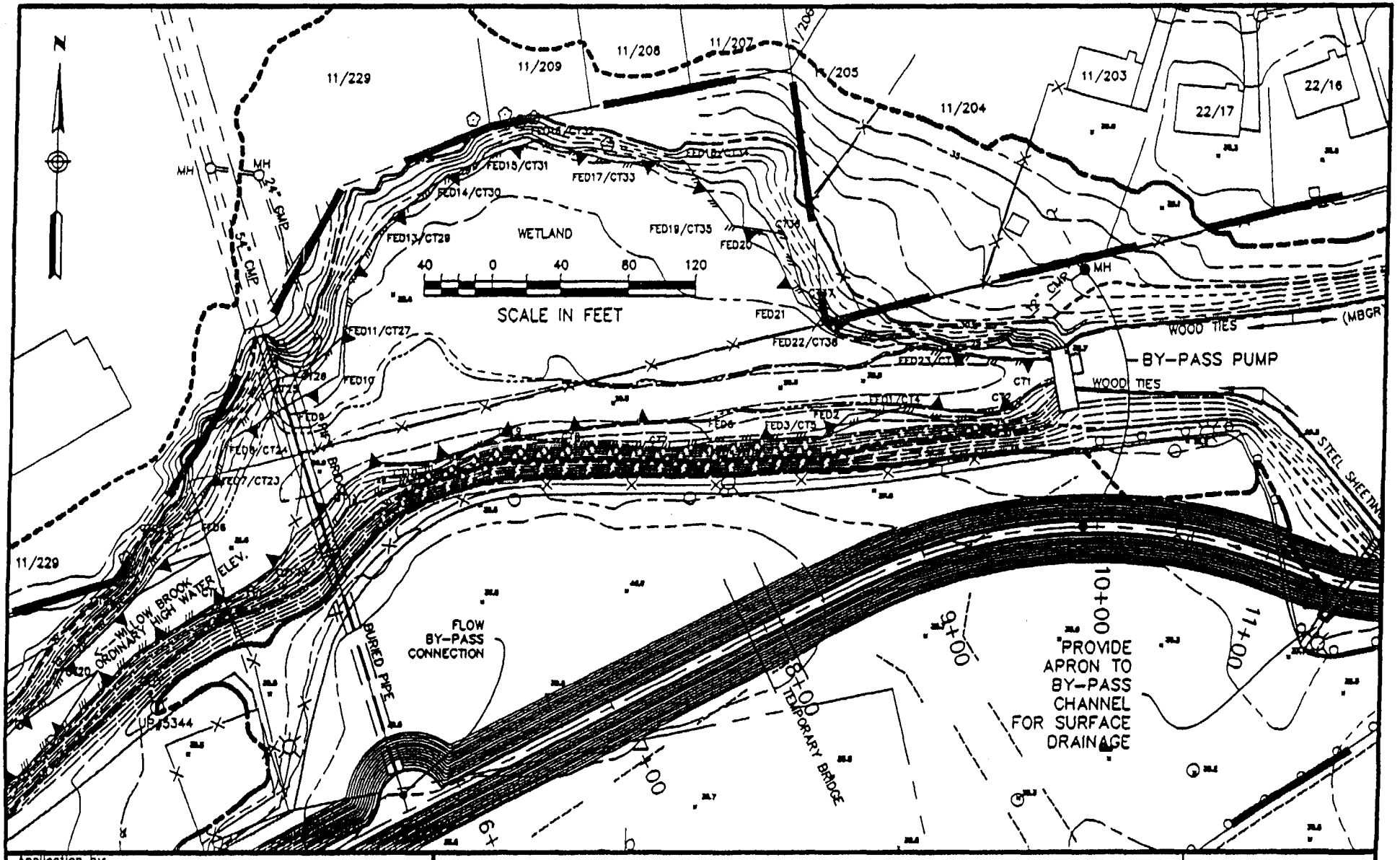
Loureiro Engineering Associates, Inc.
100 Northwest Drive, Plainville, Conn. 06062

Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND

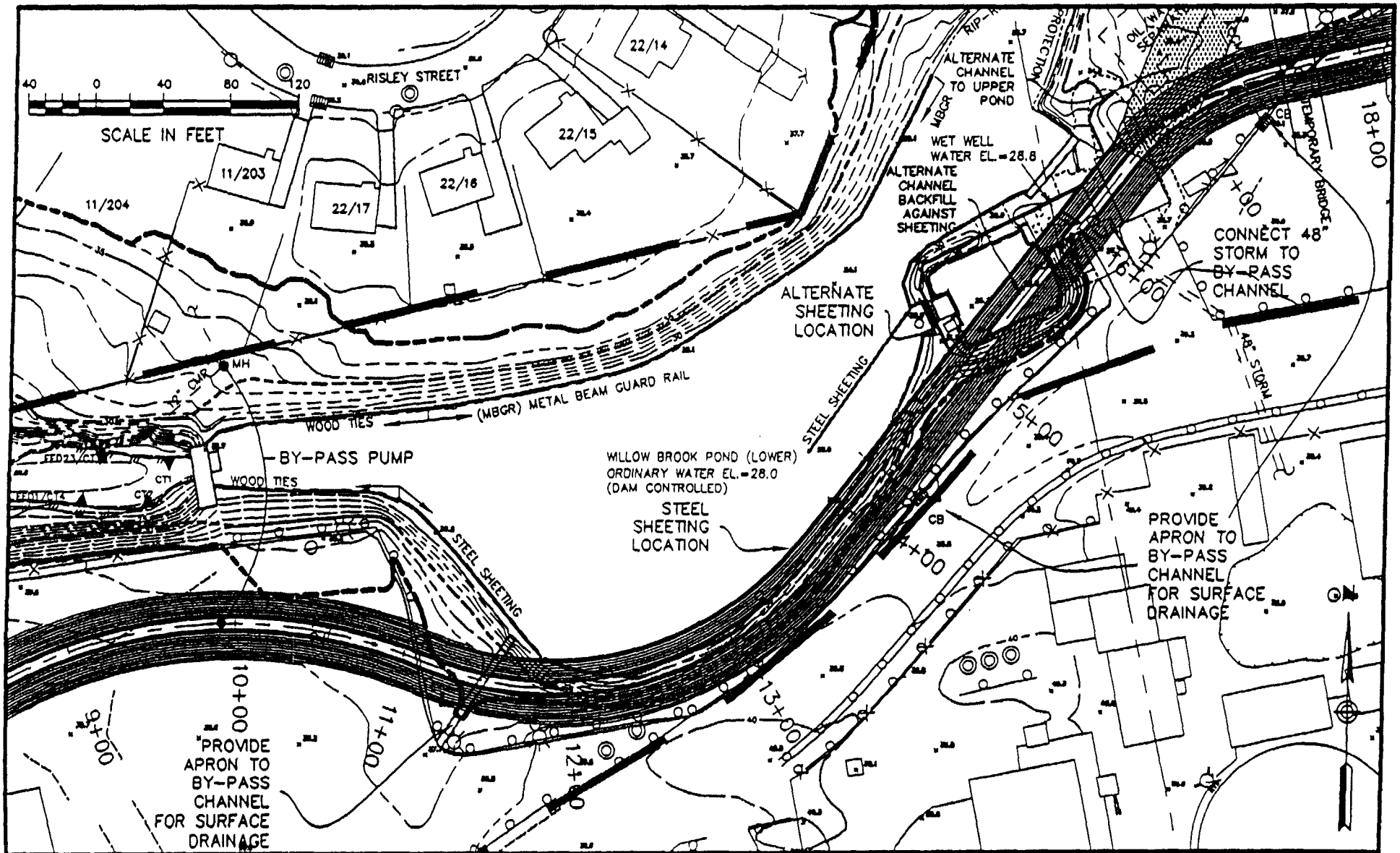
BPC 1 OF 6



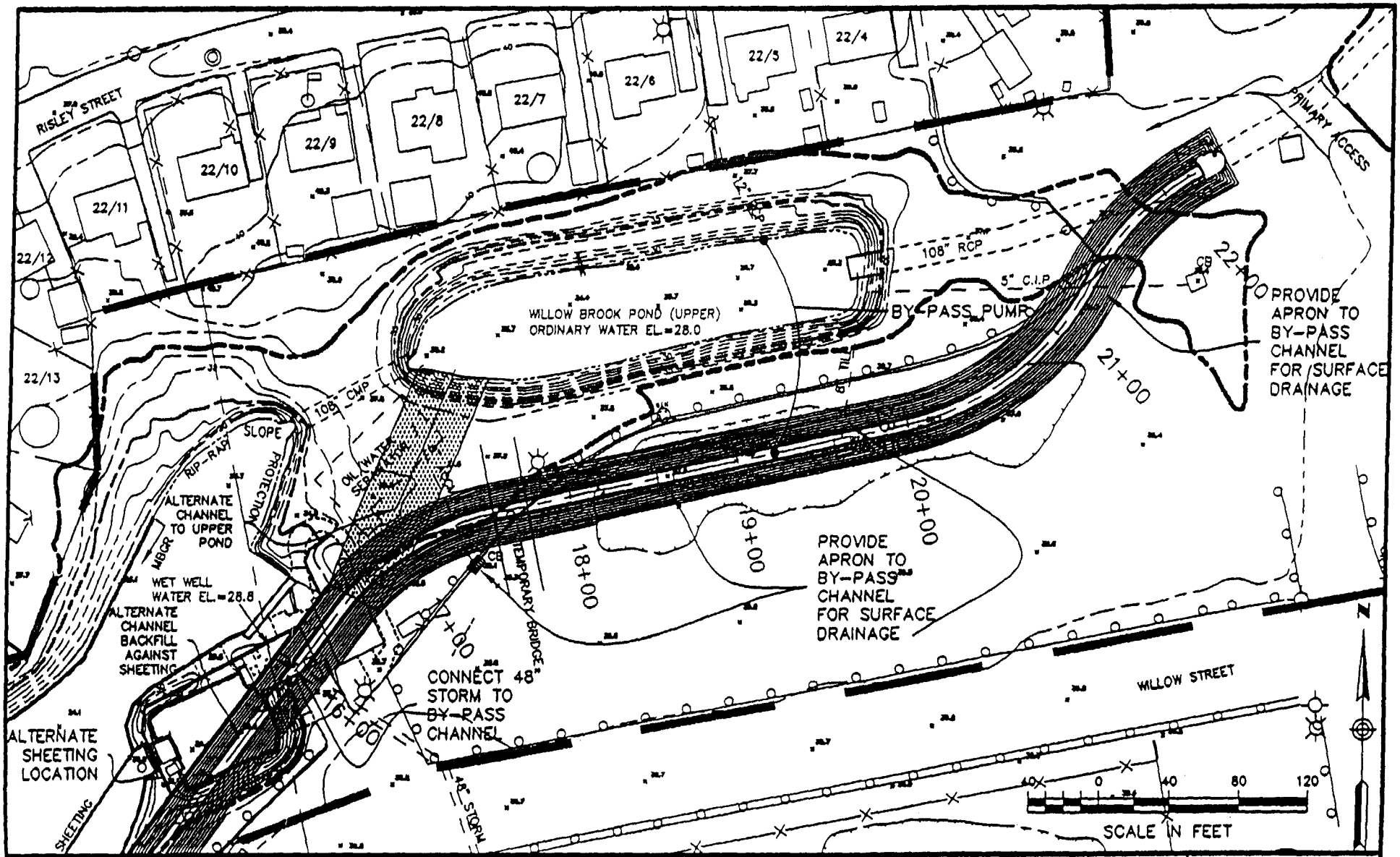
Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	BY-PASS CHANNEL STA 0+00 TO STA 7+00	Feb. 14, 2001
Loureiro Engineering Associates, Inc. 100 Northwest Drive, Plainville, Conn. 06062	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	BPC 2 of 6



Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	BY-PASS CHANNEL STA 6+00 TO STA 11+75	Feb. 14, 2001
Loureiro Engineering Associates, Inc. 100 Northwest Drive, Plainville, Conn. 06062	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	BPC 3 of 6



Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	BY-PASS CHANNEL STA 8+50 TO 18+50	Feb. 14, 2001
Loureiro Engineering Associates, Inc.	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	BPC 4 of 6



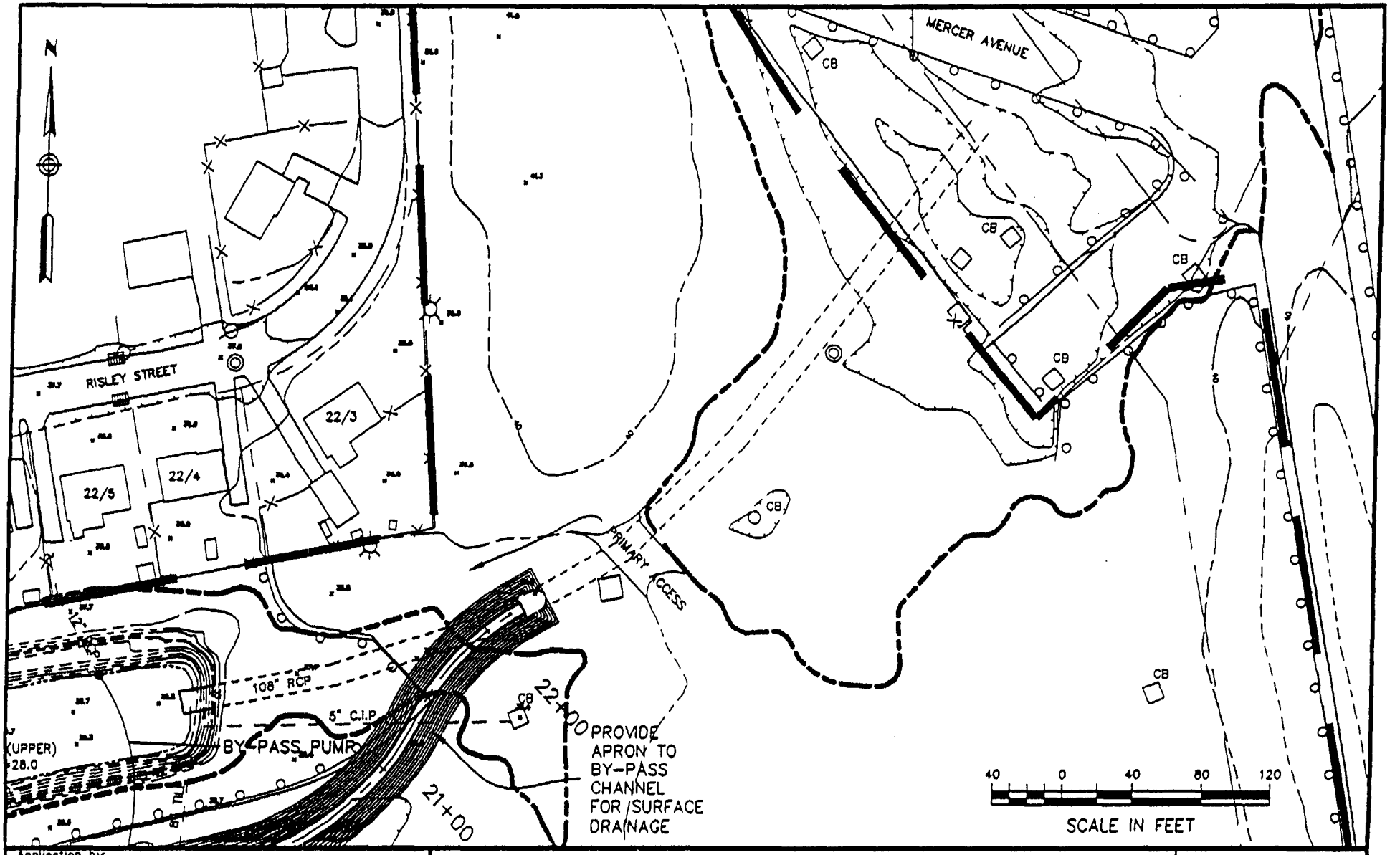
Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

BY-PASS CHANNEL
STA 14+50 TO STA 22+00

Feb. 14, 2001

Engineering Associates, Inc.

Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND



Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

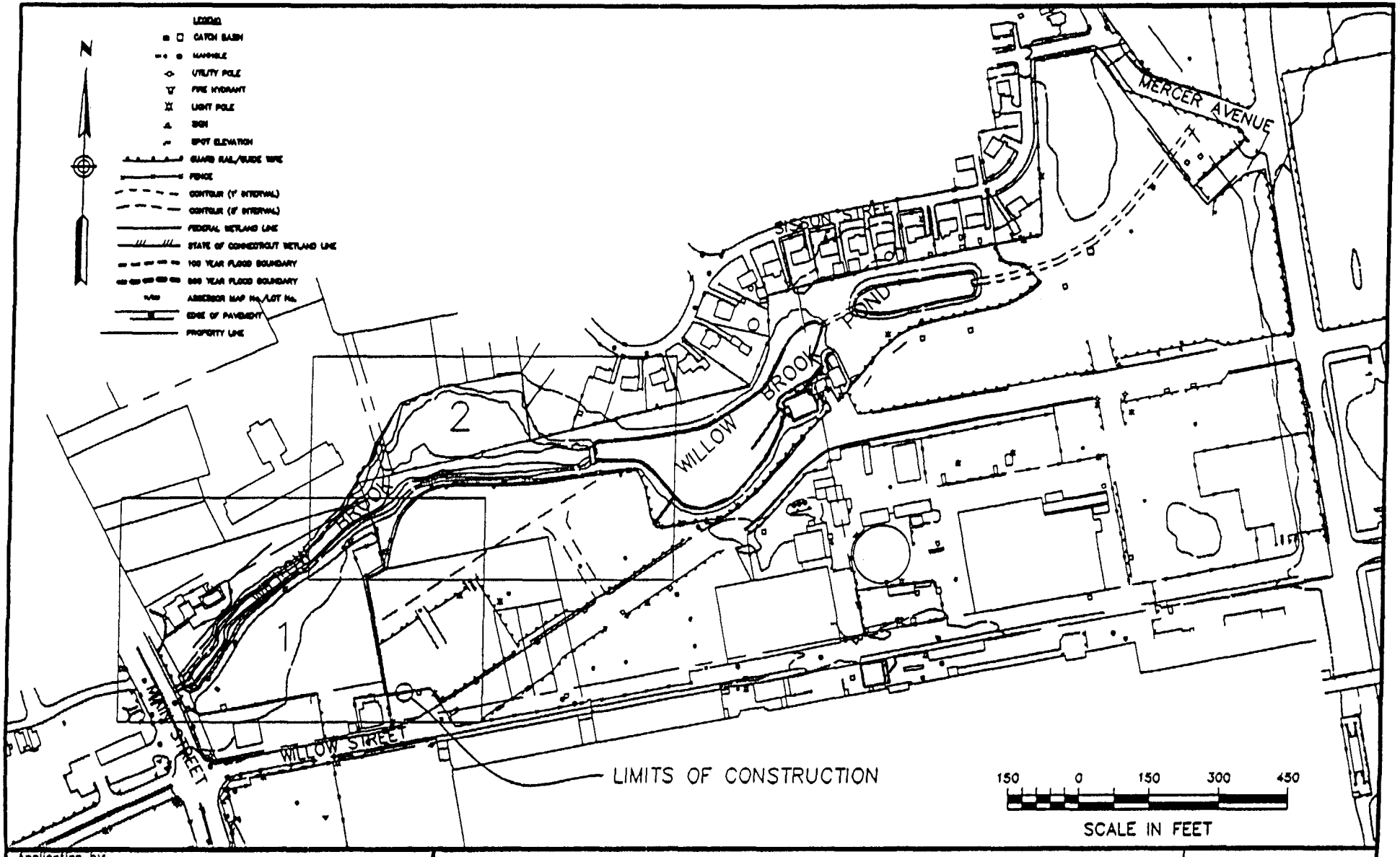
BY-PASS CHANNEL
STA 20+20 TO 22+00

Feb. 14, 2001

Loureiro Engineering Associates, Inc.
100 Northwest Drive, Plainville, Conn. 06062

Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND

BPC 6 of 6



Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

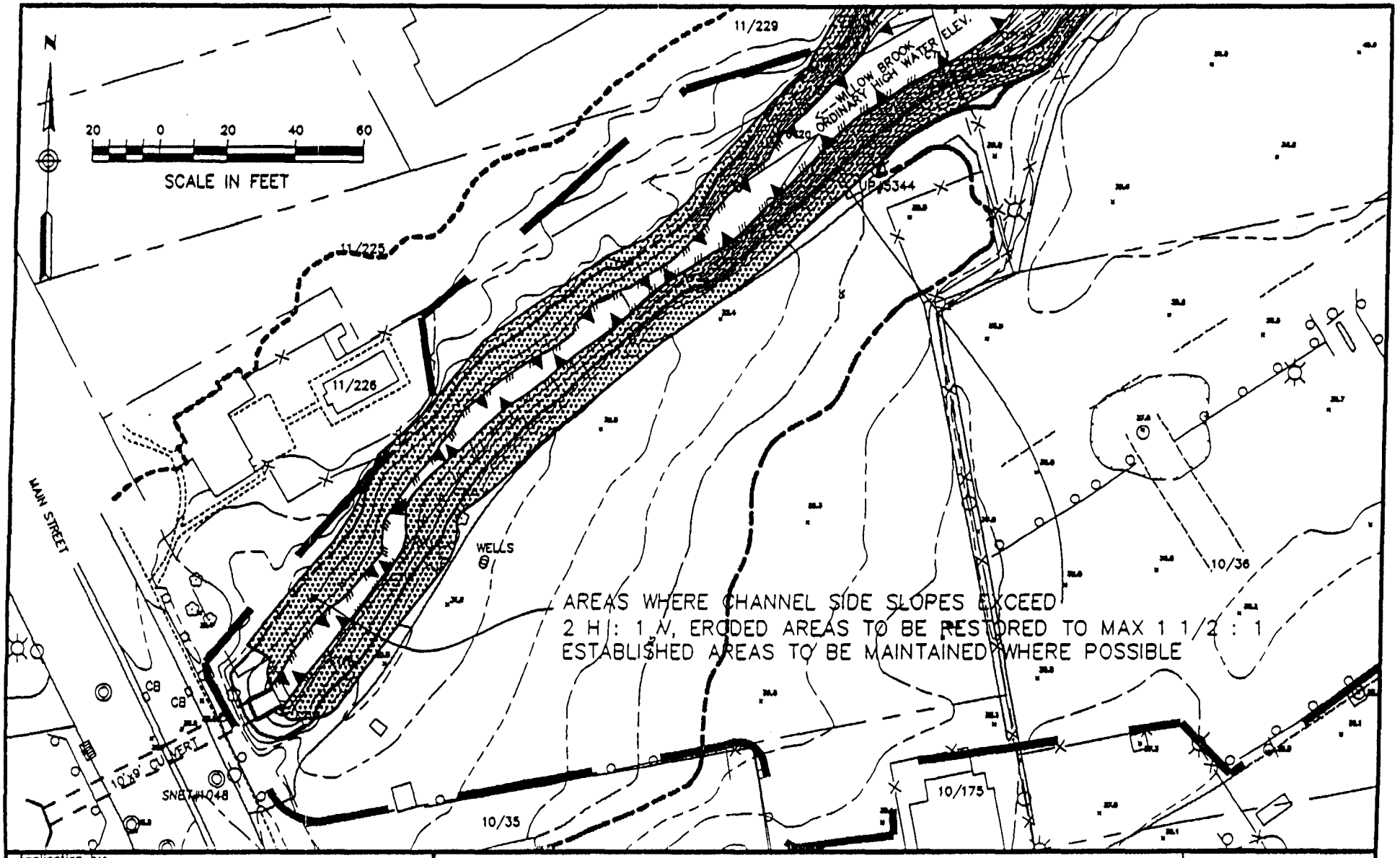
CHANNEL IMPROVEMENTS
OVERALL SHEET LAYOUT

Feb. 14, 2001

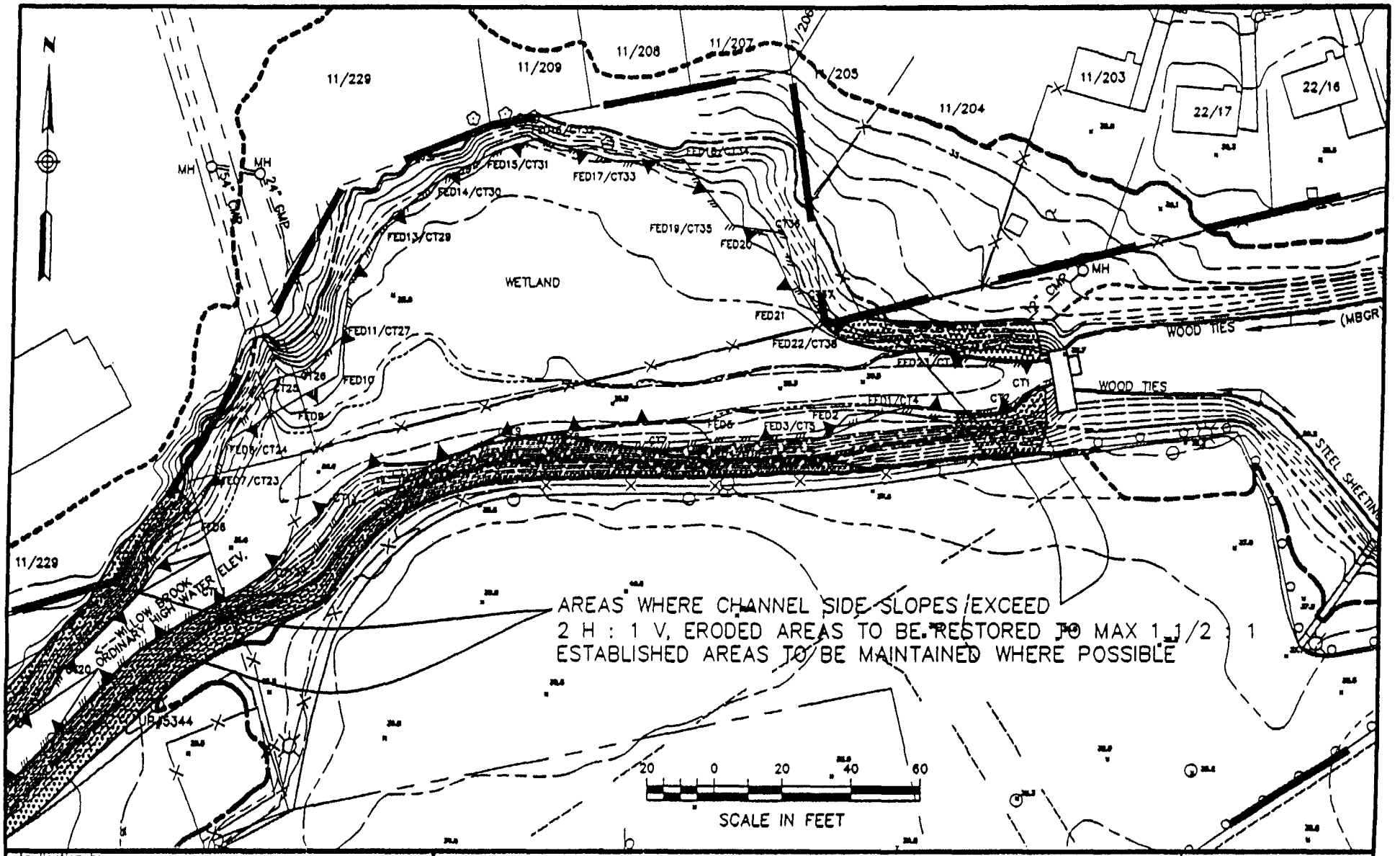
Loureiro Engineering Associates, Inc.
100 Northwest Drive, Plainville, Conn. 06062

Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND

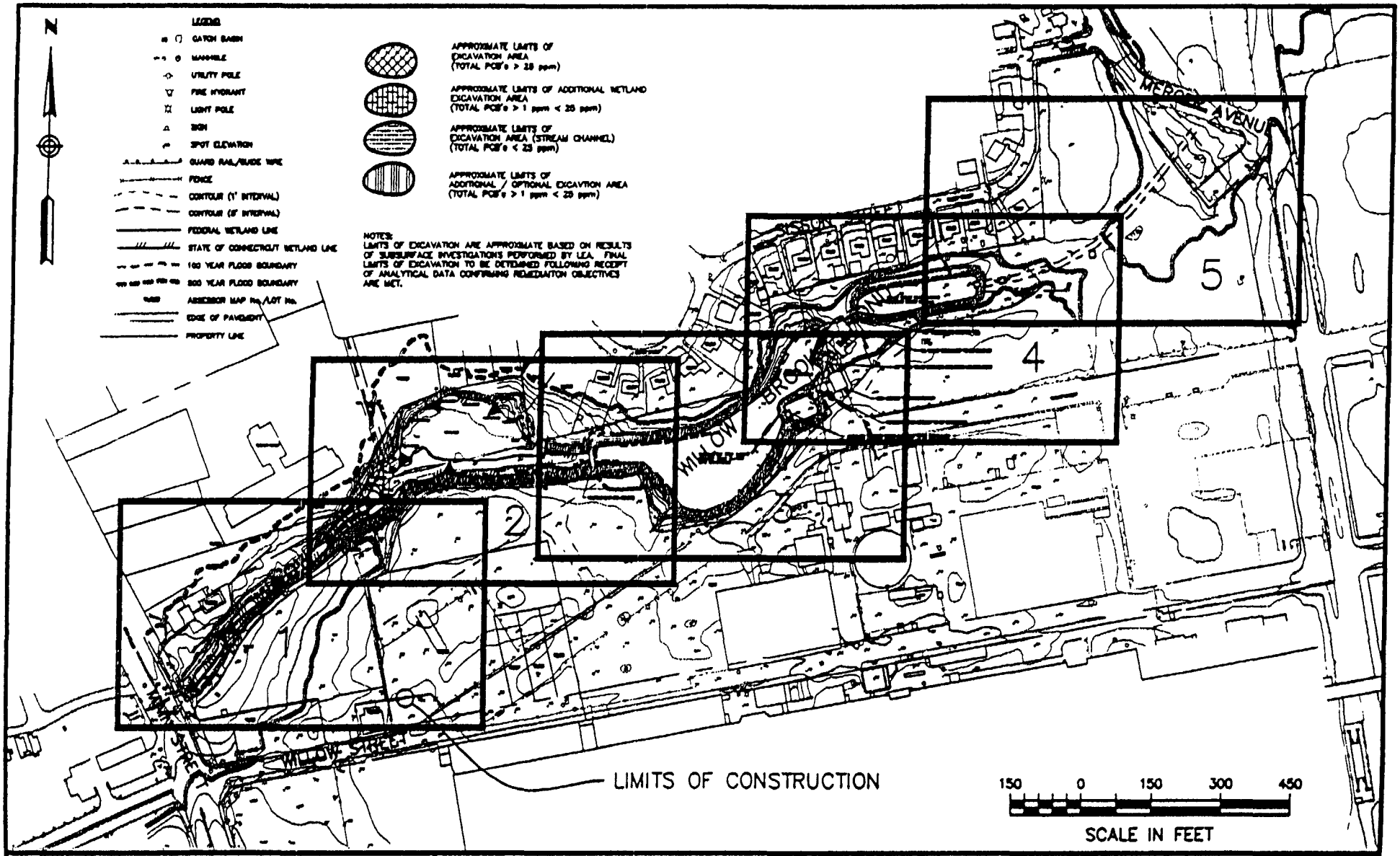
CI 1 OF 3



Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	CHANNEL IMPROVEMENTS SHEET 1	Feb. 14, 2001
Loureiro Engineering Associates, Inc. 100 Northwest Drive, Plainville, Conn. 06062	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	CI 2 of 3



Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	CHANNEL IMPROVEMENTS SHEET 2	Feb. 14, 2001
Loureiro Engineering Associates, Inc. 100 Northwest Drive, Plainville, Conn. 06062	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	Cl 3 of 3



Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

EXCAVATION AREAS
OVERALL SHEET LAYOUT

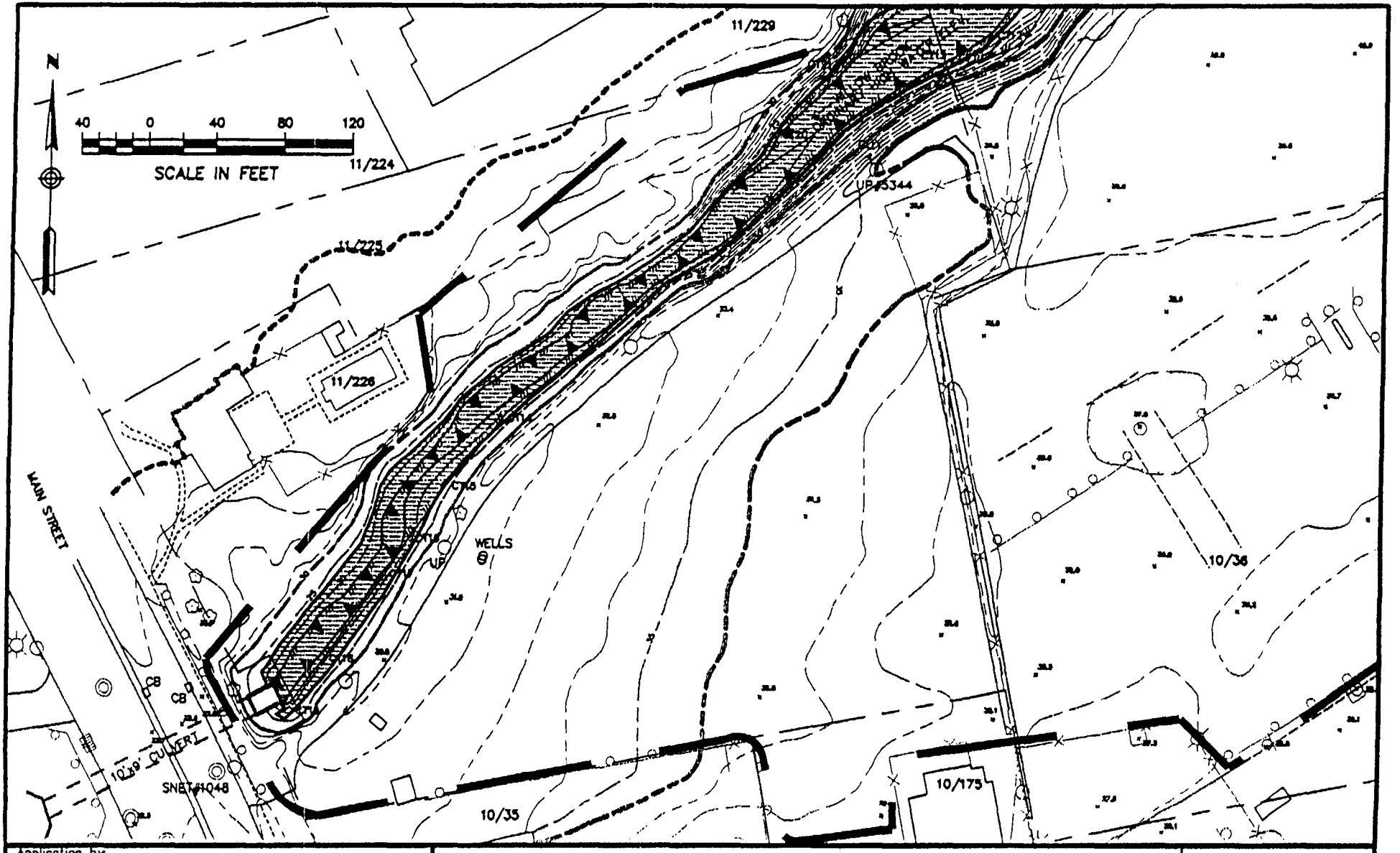
Feb. 14, 2001

Loureiro Engineering Associates, Inc.
100 Northwest Drive, Plainville, Conn. 06062

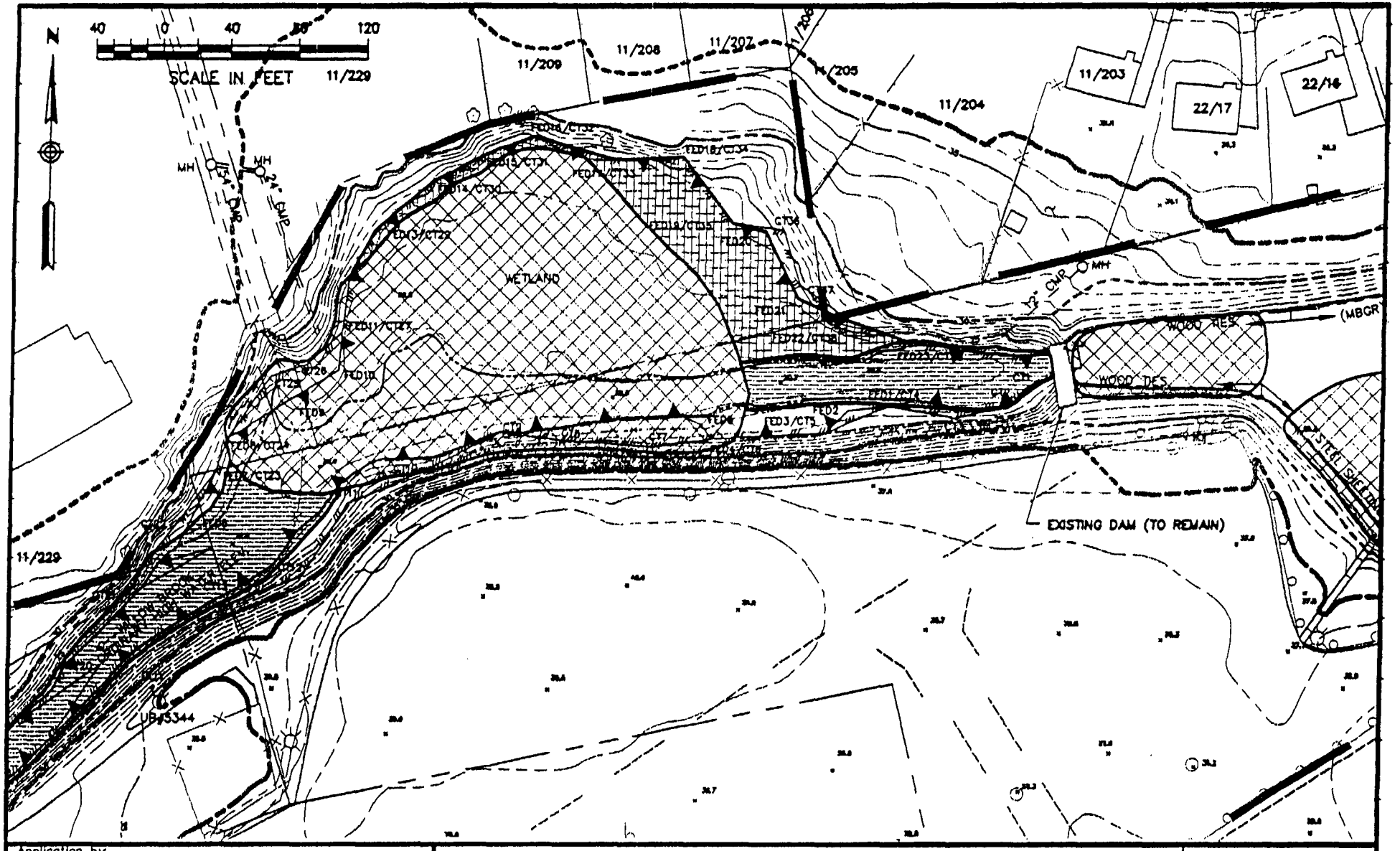
Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND

EXC 1 OF 6

EXC-Avg

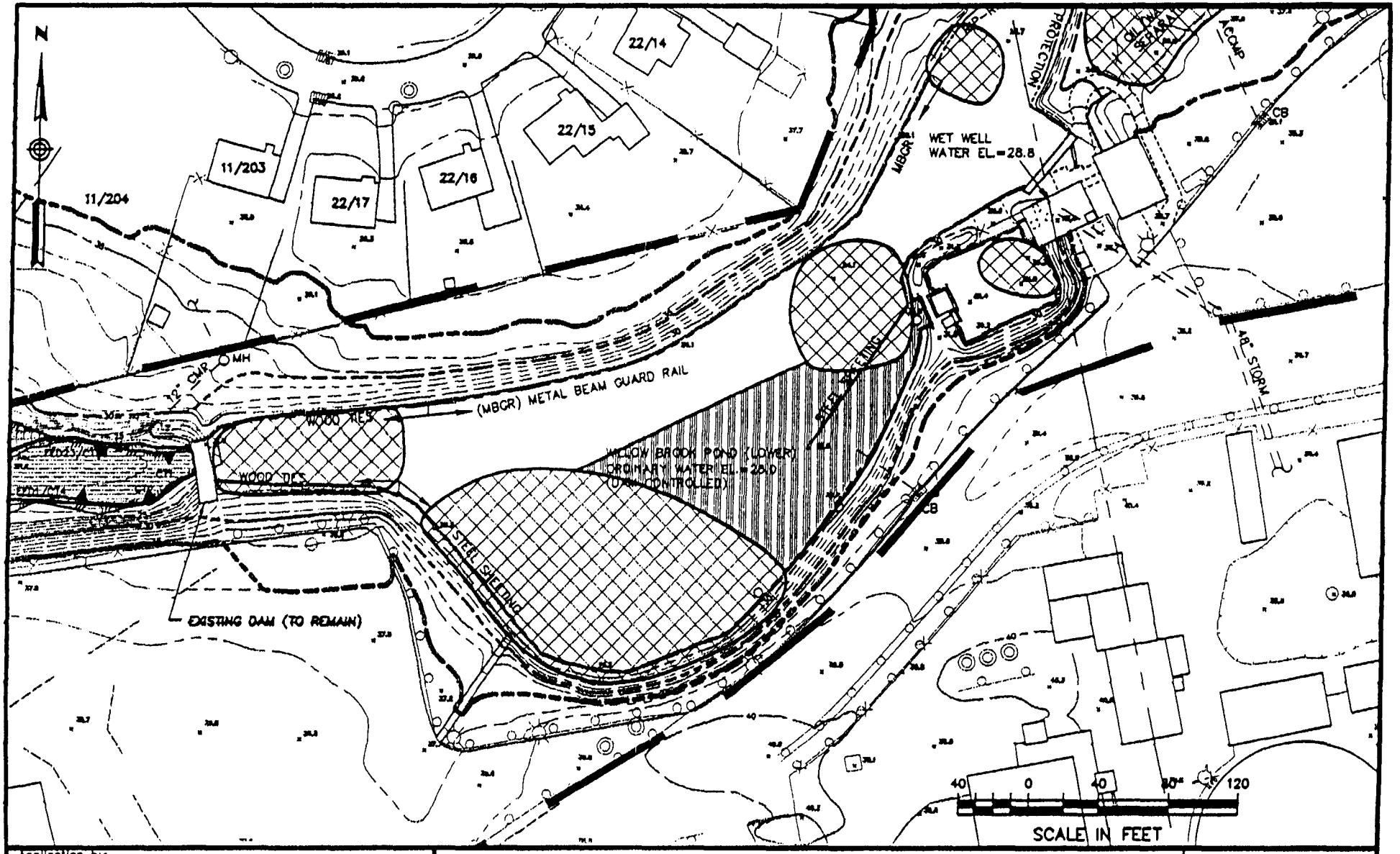


Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	EXCAVATION AREAS SHEET 1	Feb. 14, 2001
Loureiro Engineering Associates, Inc. 100 Northwest Drive, Plainville, Conn. 06062	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	EXC 2 of 6



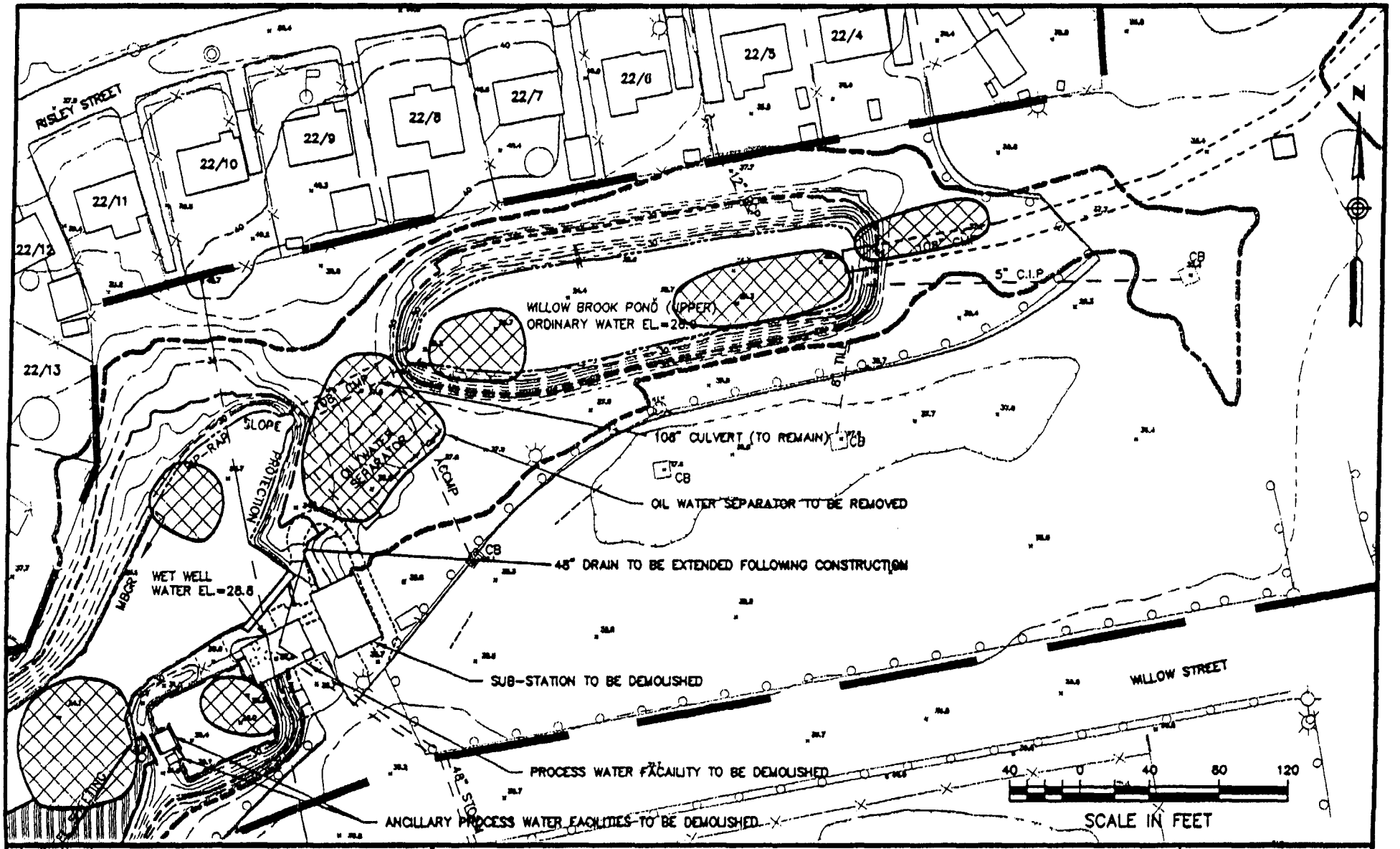
Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	EXCAVATION AREAS SHEET 2	Feb. 14, 2001
Loureiro Engineering Associates, Inc.	Purpose: Remediation of Contaminated Soil/Sediment & Restoration	EXC 3 of 6

EXC.dwg



Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	EXCAVATION AREAS SHEET 3	Feb. 14, 2001
Loureiro Engineering Associates, Inc.	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	EXC 4 of 6

EXC.dwg



Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

Loureiro Engineering Associates, Inc.

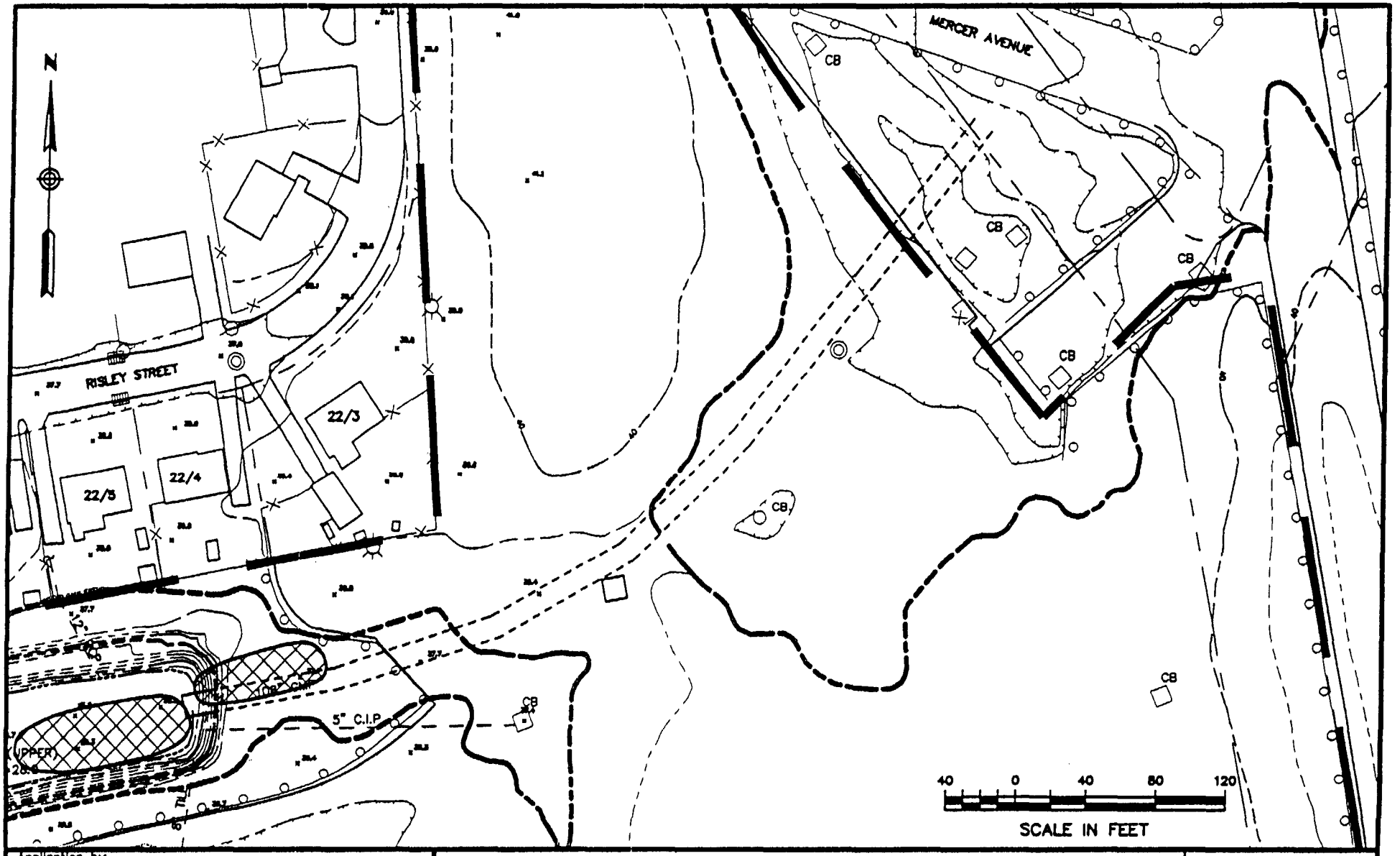
EXCAVATION AREAS
SHEET 4

Feb. 14, 2001

Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND

EXC 5 of 6

EXC.dwg



Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

EXCAVATION AREAS
SHEET 5

Feb. 14, 2001

Loureiro Engineering Associates, Inc.
100 Northwest Drive, Plainville, Conn. 06062

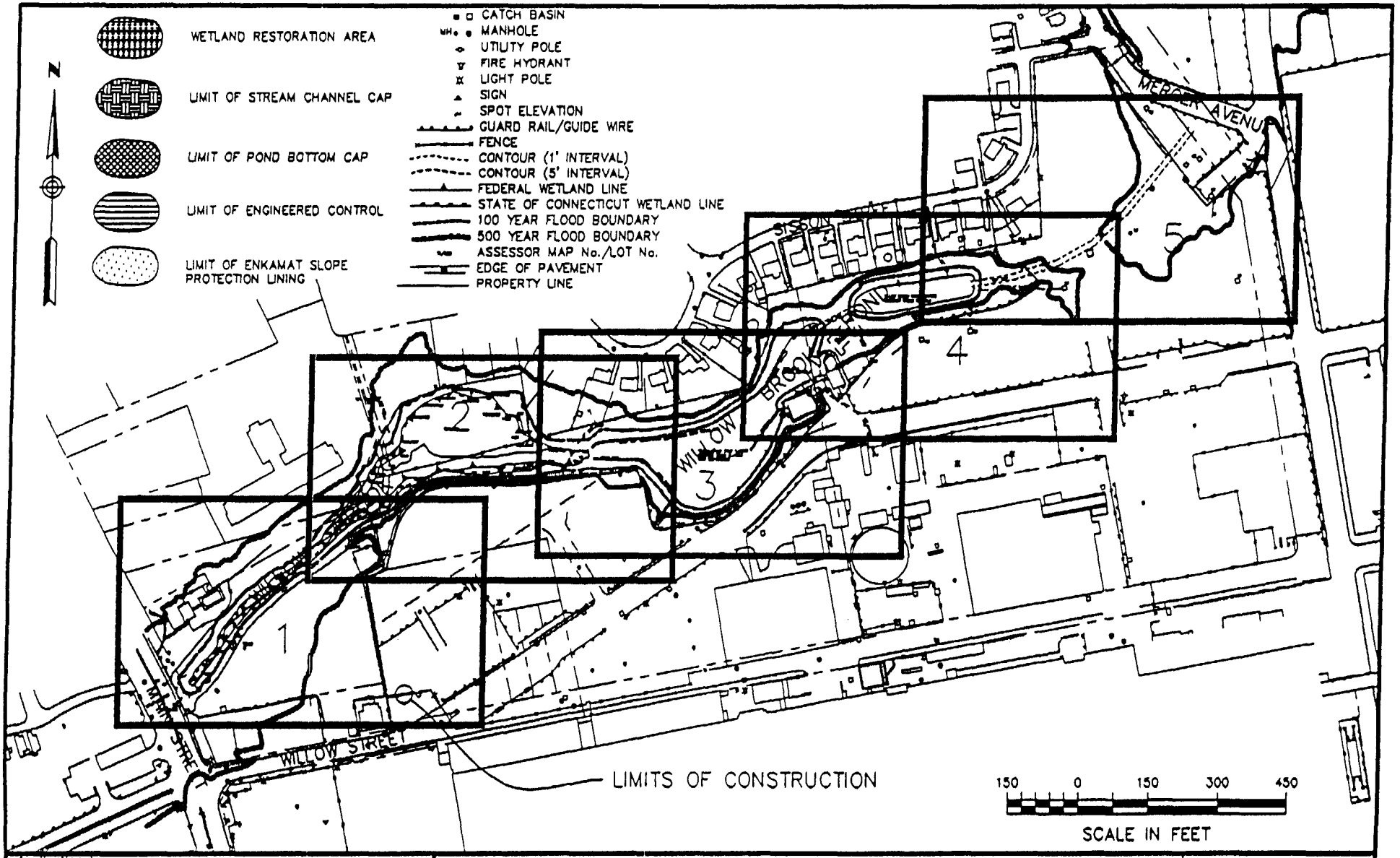
Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND
MAIN STREET, EAST HARTFORD, HARTFORD COUNTY, CONNECTICUT

EXC 6 of 6

CONSTRUCTION NOTES

1. This plan not to be used for construction without prior consultation with wetland scientist.
2. Final grading and planting plans to be based on additional observations of area hydrology.
3. All grading and planting to be completed in consultation with wetland scientist.
4. Growth medium (top soil) for wetland mitigation area to be inspected and approved by wetland scientist prior to application.
5. All disturbed wetland areas not otherwise planted shall be seeded with blackledge nursery wetland mix @ 1 pound per 3,000 square feet.
6. A pre-construction meeting between site contractor, planting contractor and wetland scientist shall be held prior to any activity in mitigation area.
7. Any vegetation retained to be tagged by wetland scientist.
8. Rough grading (50% and 100% complete) to be reviewed by wetland scientist prior to application of approved growth medium.
9. Final grading to be reviewed by wetland scientist prior to plant installation.
10. Plant materials, substitutions, and final plant locations to be reviewed by wetland scientist.
11. Mitigation area to be monitored by wetland scientist twice annually for three growing seasons post-construction as required by permits.
12. Nuisance vegetation control and/or other remedial measures to be implemented as directed by wetland scientist or permit agencies.
13. No invasive plants shall be included in the final planting plan for the project.
14. The wetland scientist shall review final construction documents.
15. Coordination between the Wetland Scientist and the site contractor will begin at the pre-construction meeting, and include site inspections after rough grading is 50% and 100% complete, after final grading is complete, and at the time of plant installation. Prior to installation, the Wetland Scientist, in consultation with the engineer, will approve the final plant selection and location.
16. The current Best Management Practices as per CT Guidelines for Erosion and Sediment Control shall, at a minimum, be incorporated into the plans. All temporary erosion and sediment control devices and structures shall be disassembled and properly disposed of prior to November three full growing seasons after planting (if the site is stable and mitigation successful). Erodible sediment collected by these devices must also be removed and placed upland in a manner that will prevent its later erosion and transport to a waterway or wetland.

Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	SITE RESTORATION CONSTRUCTION NOTES	Feb. 14, 2001
Loureiro Engineering Associates, Inc.	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	SR 1 of 7



Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

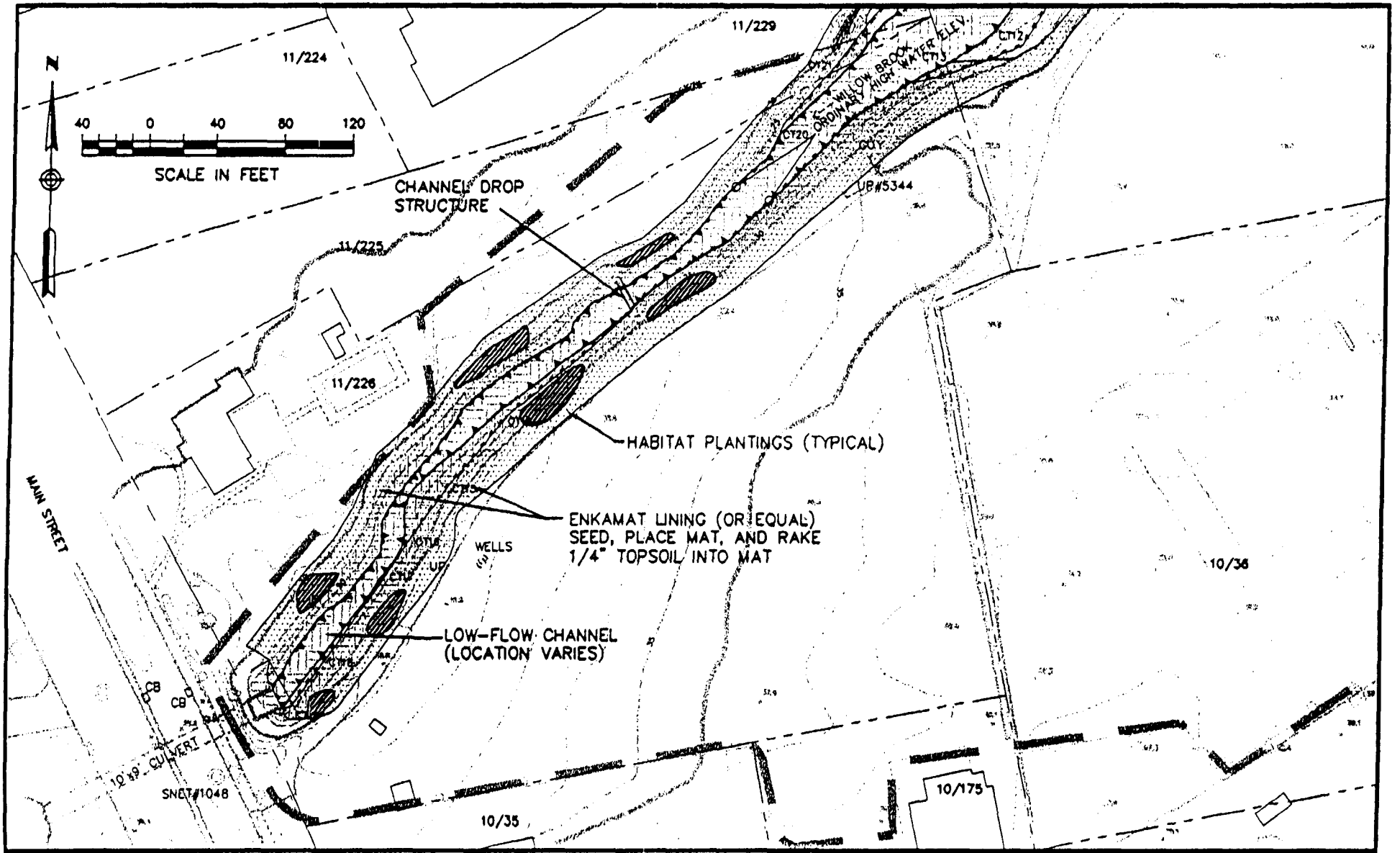
SITE RESTORATION
OVERALL SHEET LAYOUT

Feb. 14, 2001

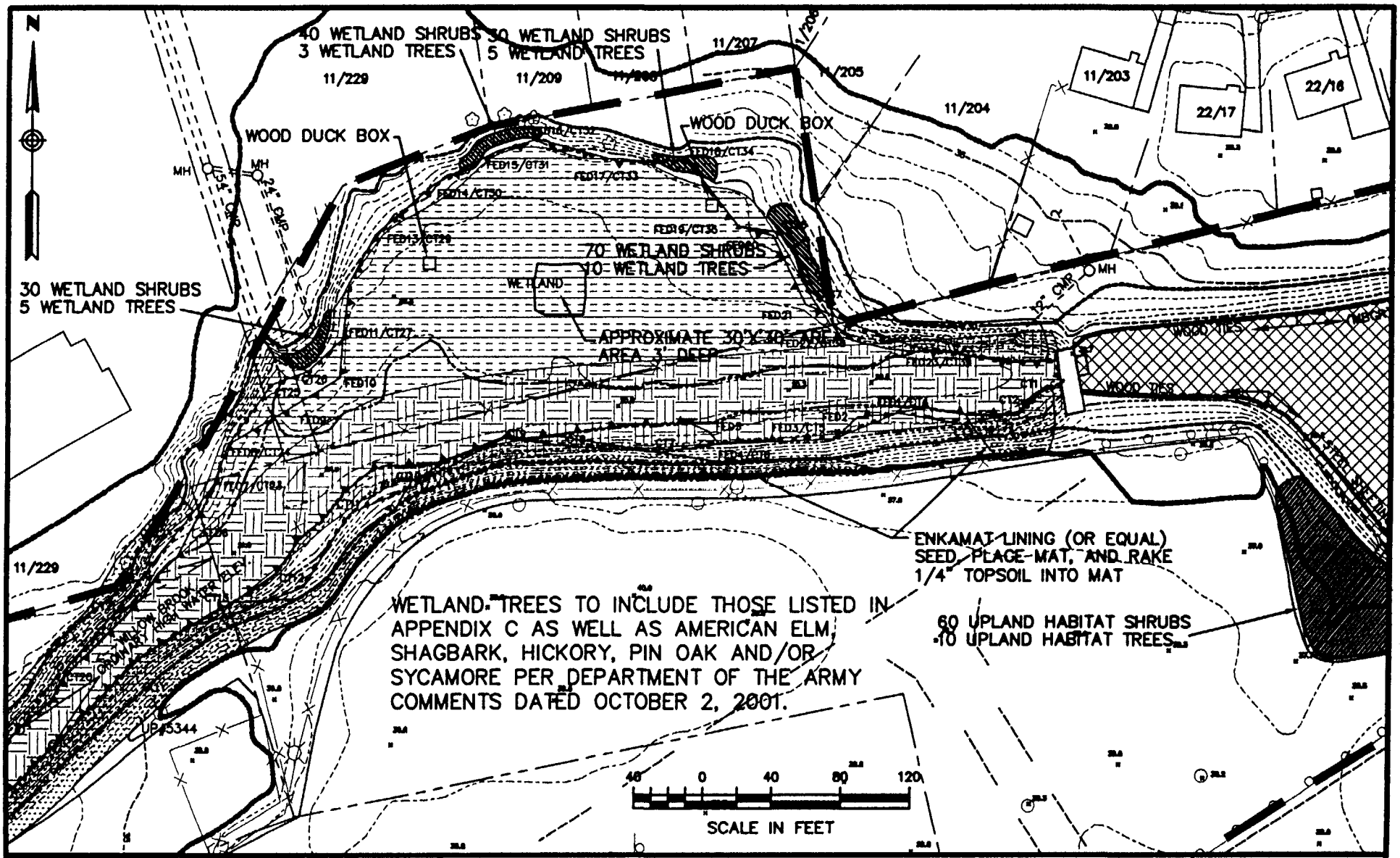
Loureiro Engineering Associates, Inc.

Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND

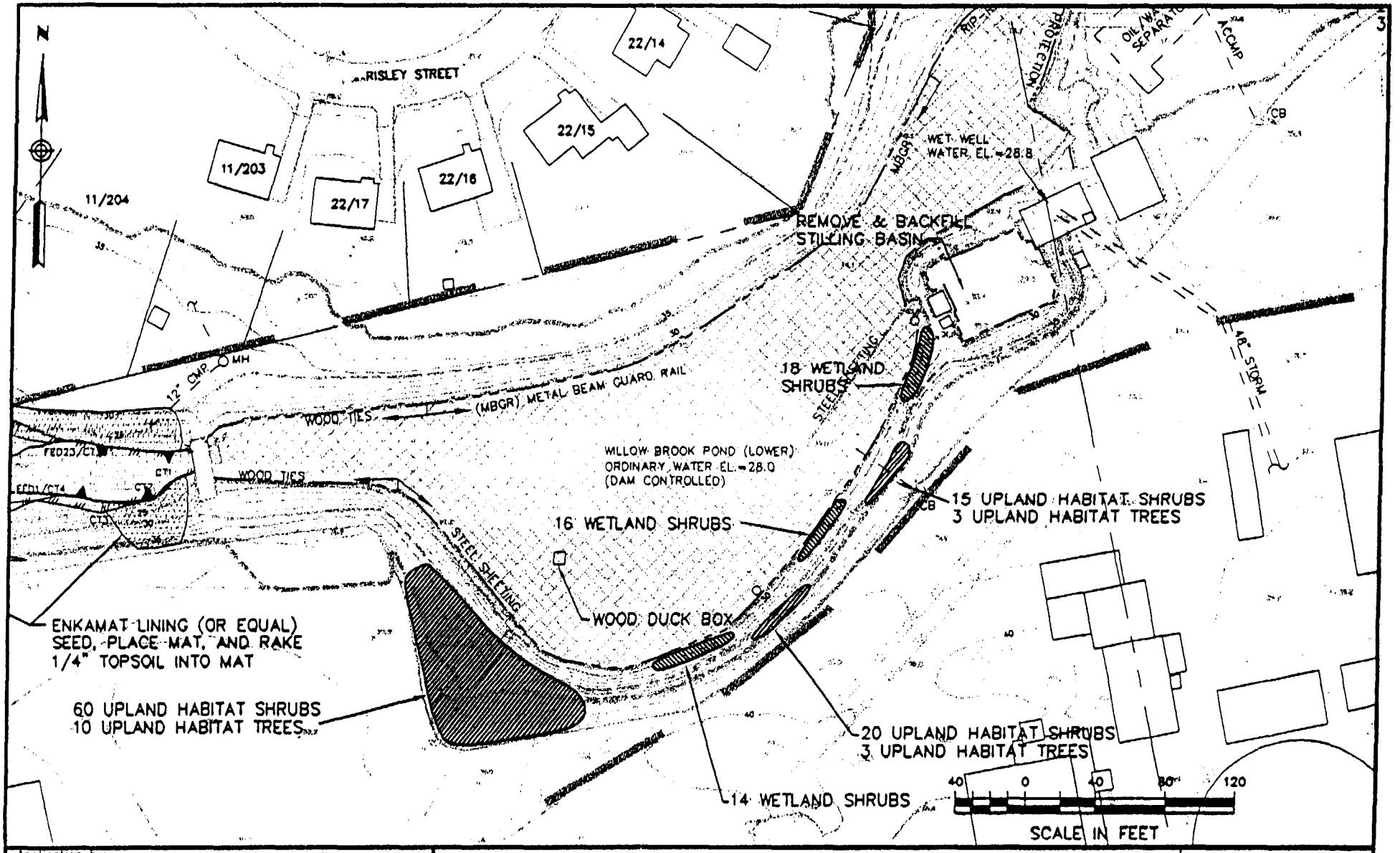
SR 2 of 7



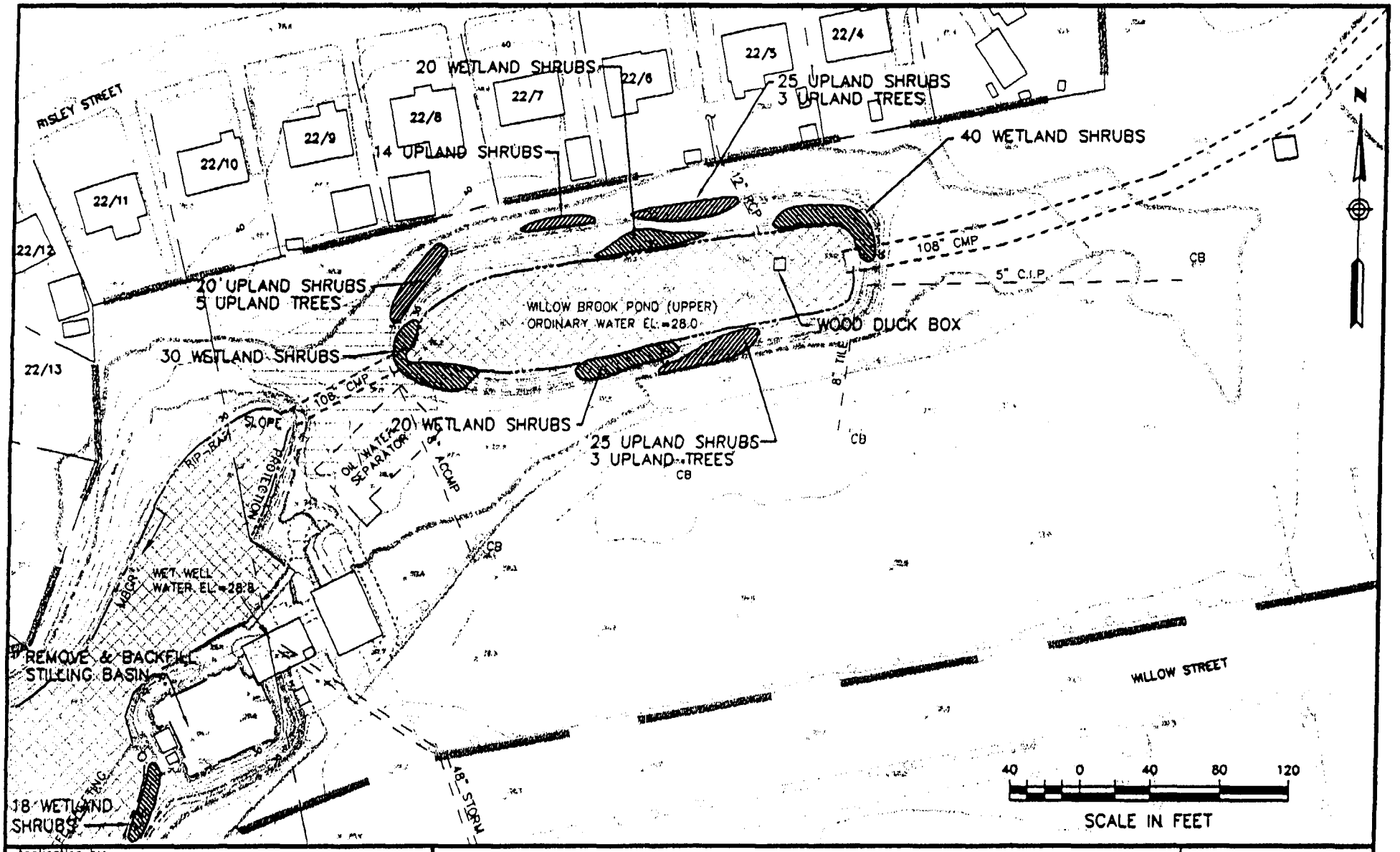
Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	SITE RESTORATION SHEET 1	Feb. 14, 2001
Loureiro Engineering Associates, Inc.	Purpose: Remediation of Contaminated Soil/Sediment & Restoration	SR 3 of 7



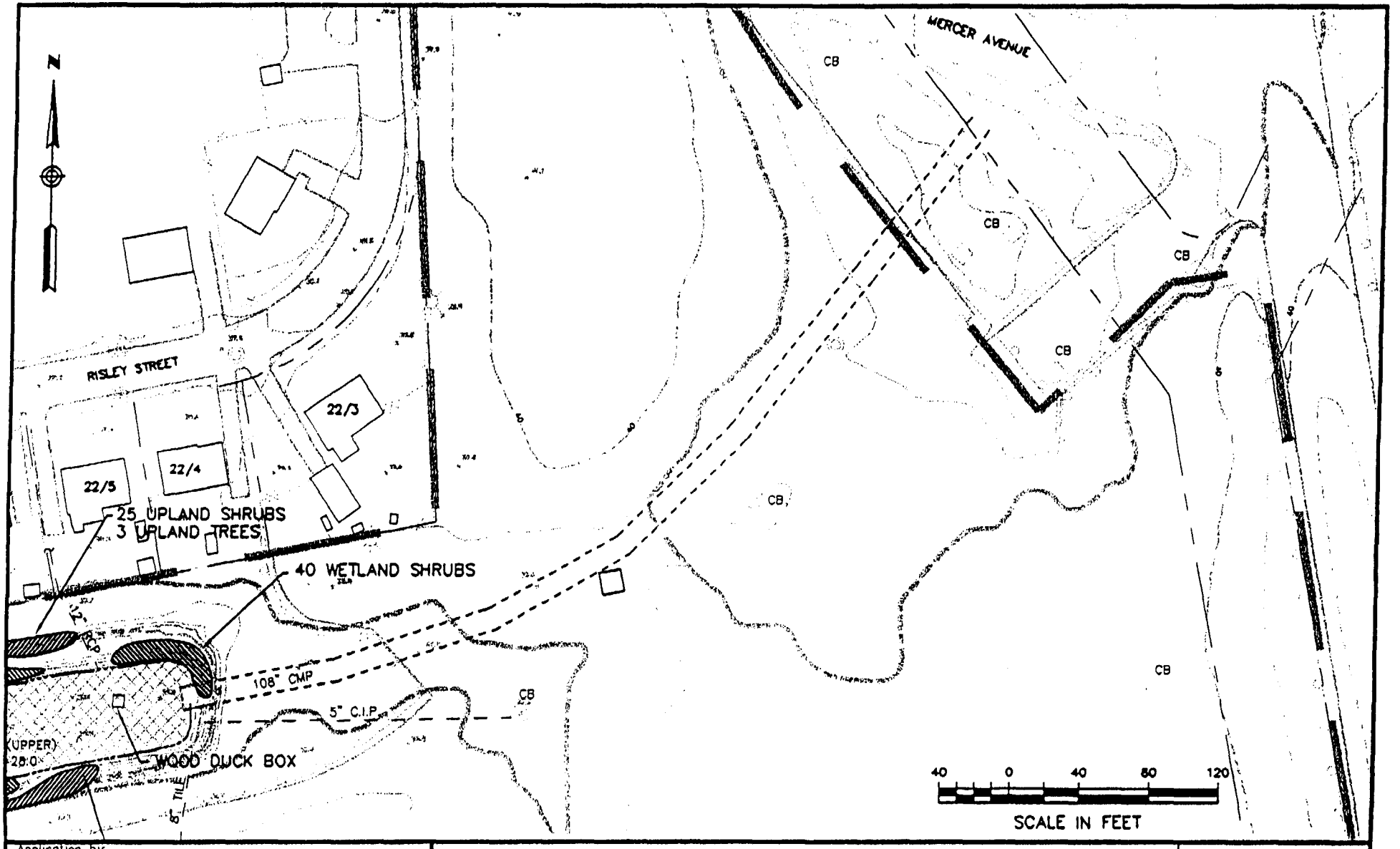
Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	SITE RESTORATION SHEET 2	Rev. 01/18/02 Feb. 14, 2001
Loureiro Engineering Associates, Inc. 100 Northwest Drive, Plainville, Conn. 06062 An Employee Owned Company 860-747-6181	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND MAIN STREET, EAST HARTFORD, HARTFORD COUNTY, CONNECTICUT	SR 4 of 7



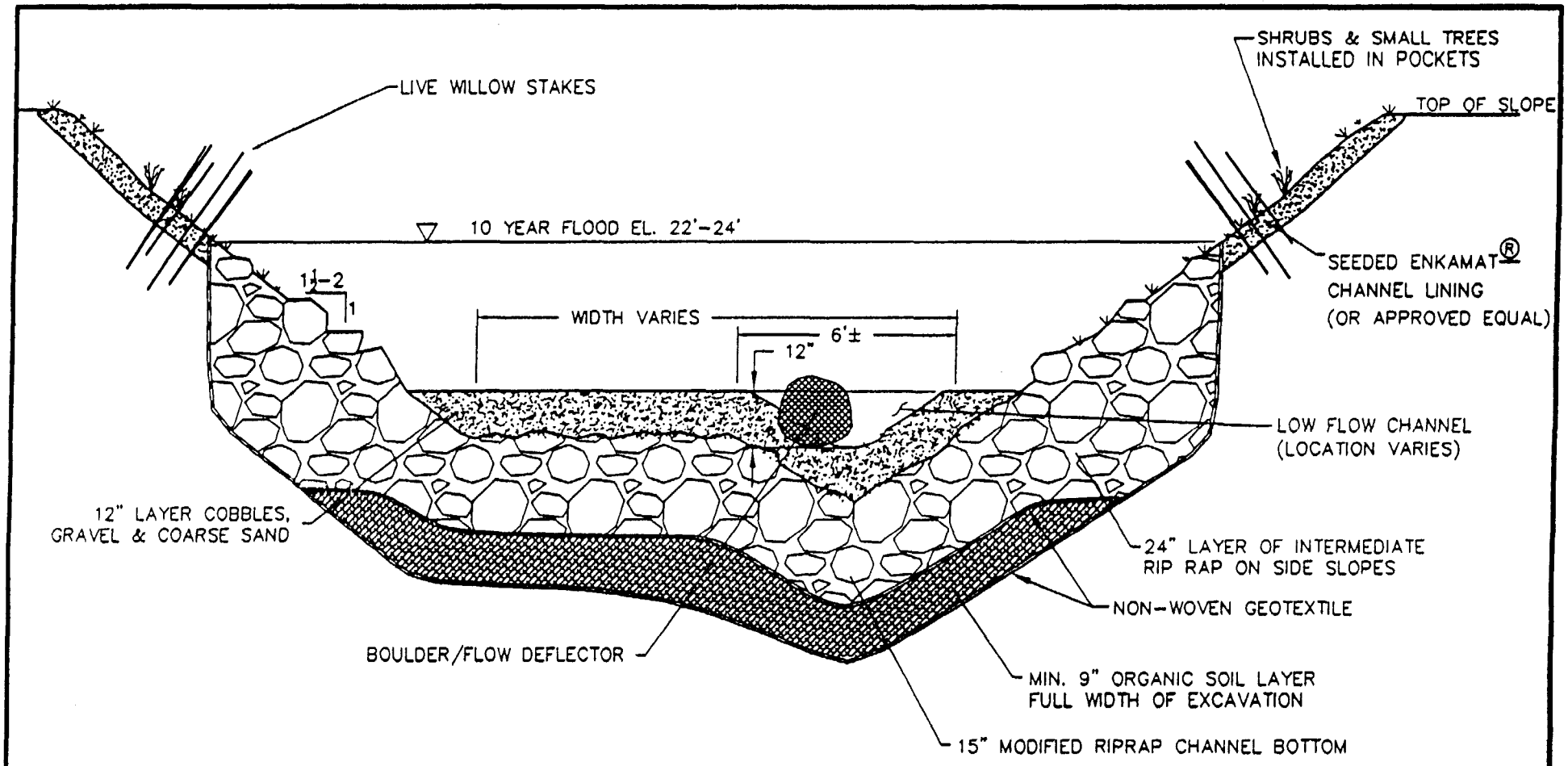
Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	SITE RESTORATION SHEET 3	Feb. 14, 2001
Loureiro Engineering Associates, Inc.	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	SR 5 of 7



Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	SITE RESTORATION SHEET 4	Feb. 14, 2001
Loureiro Engineering Associates, Inc.	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	SR 6 of 7



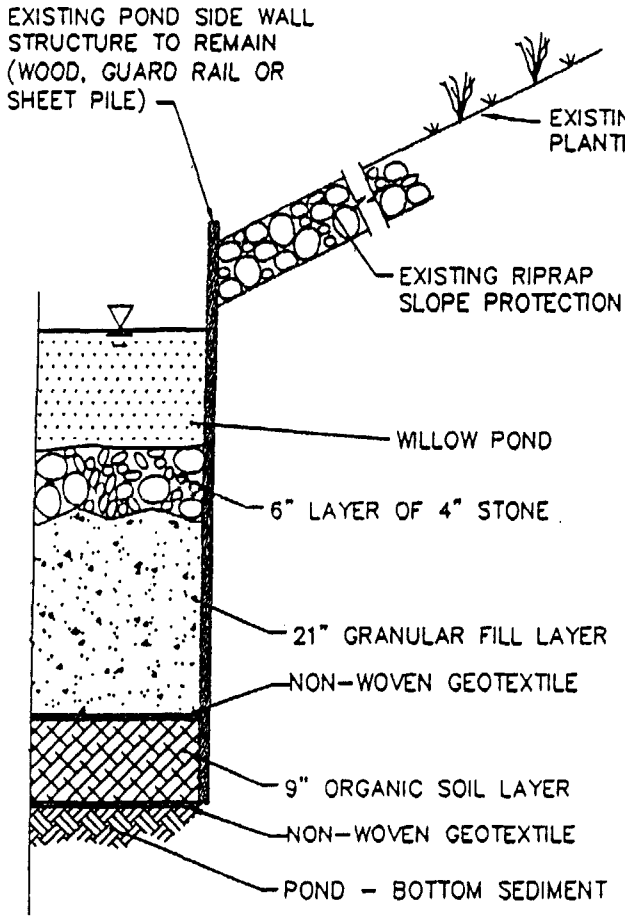
Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	SITE RESTORATION SHEET 5	Feb. 14, 2001
Loureiro Engineering Associates, Inc.	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	SR 7 of 7



NOTE: BOULDERS OR FLOW DEFLECTORS SHALL BE NO WIDER THAN 20% OF THE STREAM WIDTH. THERE SHALL BE NO MORE THAN ONE BOULDER PER 300 FT² OF CHANNEL

Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	DETAIL – STREAM CHANNEL CAP	Feb. 14, 2001
Loureiro Engineering Associates, Inc.	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	DET 1 of 9

1002-DET-STREAM.dwg



LOWER POND

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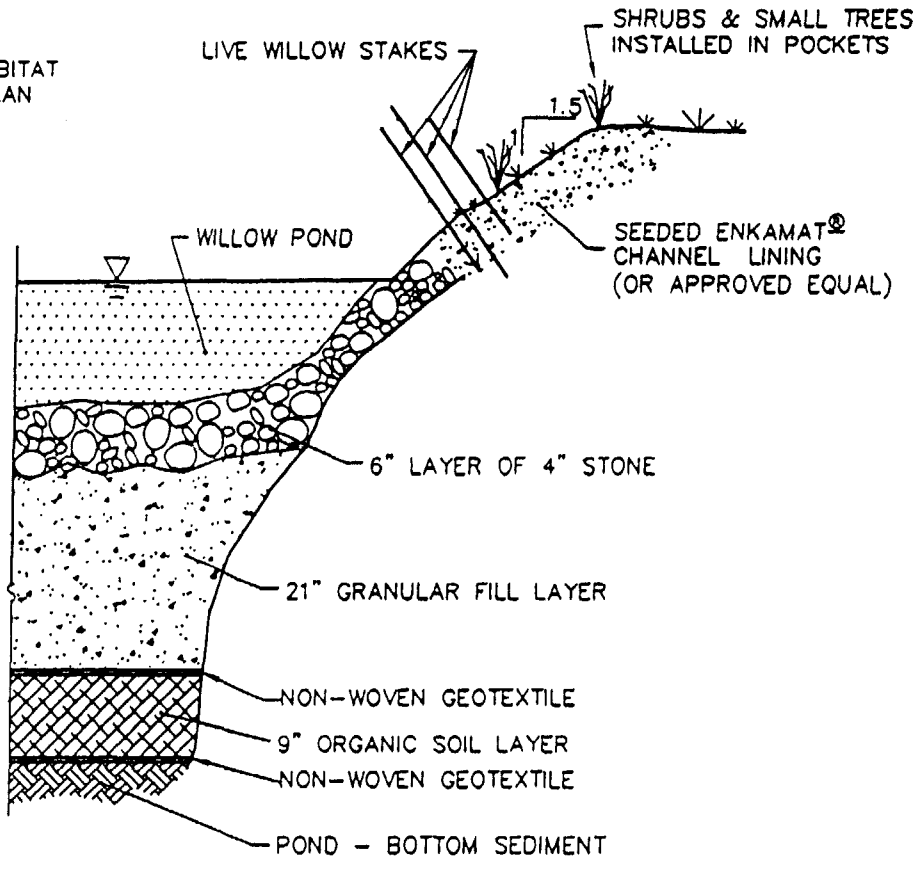
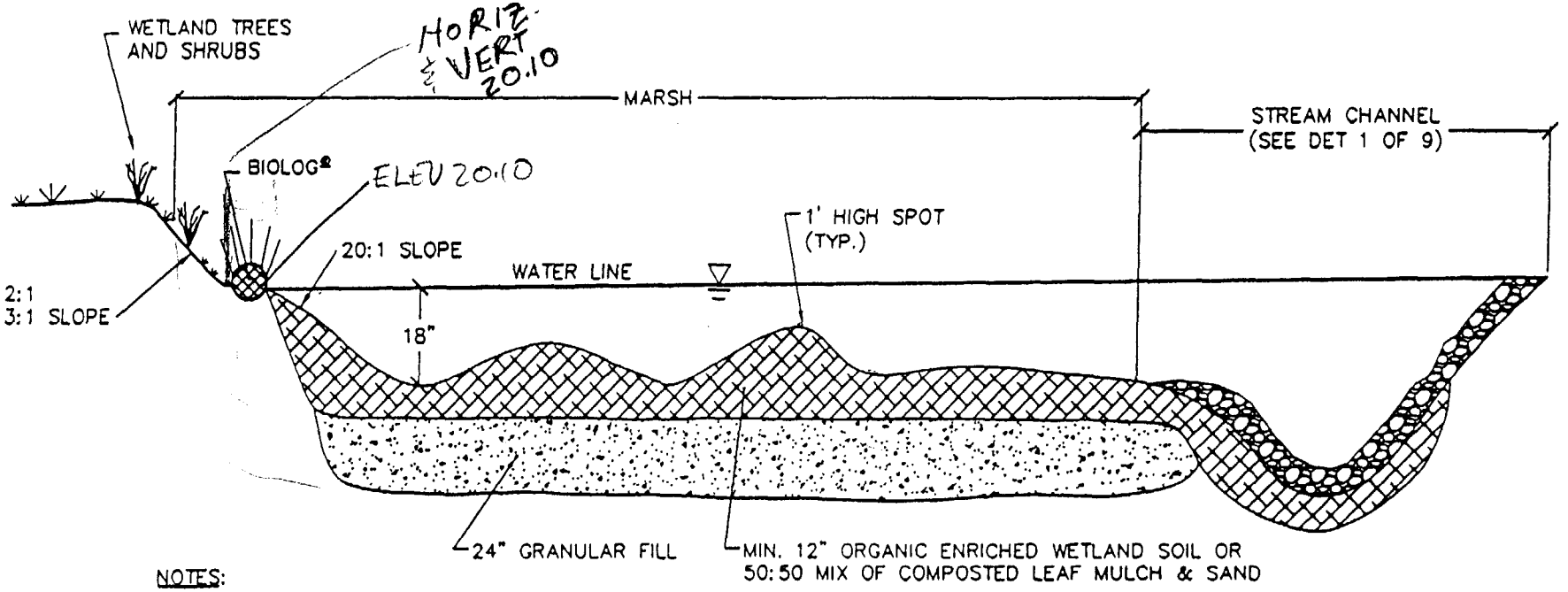


UPPER POND

NOT TO SCALE

Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	DETAIL - POND BOTTOM CAP	Feb. 14, 2001
Loureiro Engineering Associates, Inc.	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	DET 2 of 9

T002-DETS.dwg



NOTES:

1 PLANT 25% OF MARSH SURFACE WITH WETLAND HERBS AND EMERGENTS @ 2' O.C.

2 PLANT 25% OF WETLAND EDGE WITH TREES AND SHRUBS, 5' AVERAGE O.C., IN MASSES

3 PLANT BERM AND HIGH SPOTS WITH WETLAND SHRUBS.

4 PLANT BIOLOG® WITH WETLAND HERBS AT 1' O.C.

5 HIGH SPOTS TO BE 1'± ABOVE MARSH SURFACE.

6 SEED ALL EXPOSED WETLAND AREAS IN BLACKLEDGE RIVER NURSERY WETLAND SEED MIX (OR APPROVED EQUAL) AT 1lb/3000 ft²

7 SOIL SURFACE TO BE 6" – 18" BELOW WATER LEVEL OF STREAM.

N.T.S.

Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	**DETAIL – WETLAND RESTORATION**	Feb. 14, 2001
Loureiro Engineering Associates, Inc.	**Purpose: Remediation of Contaminated Soil/Sediment & Restoration**	DET 3 of 9

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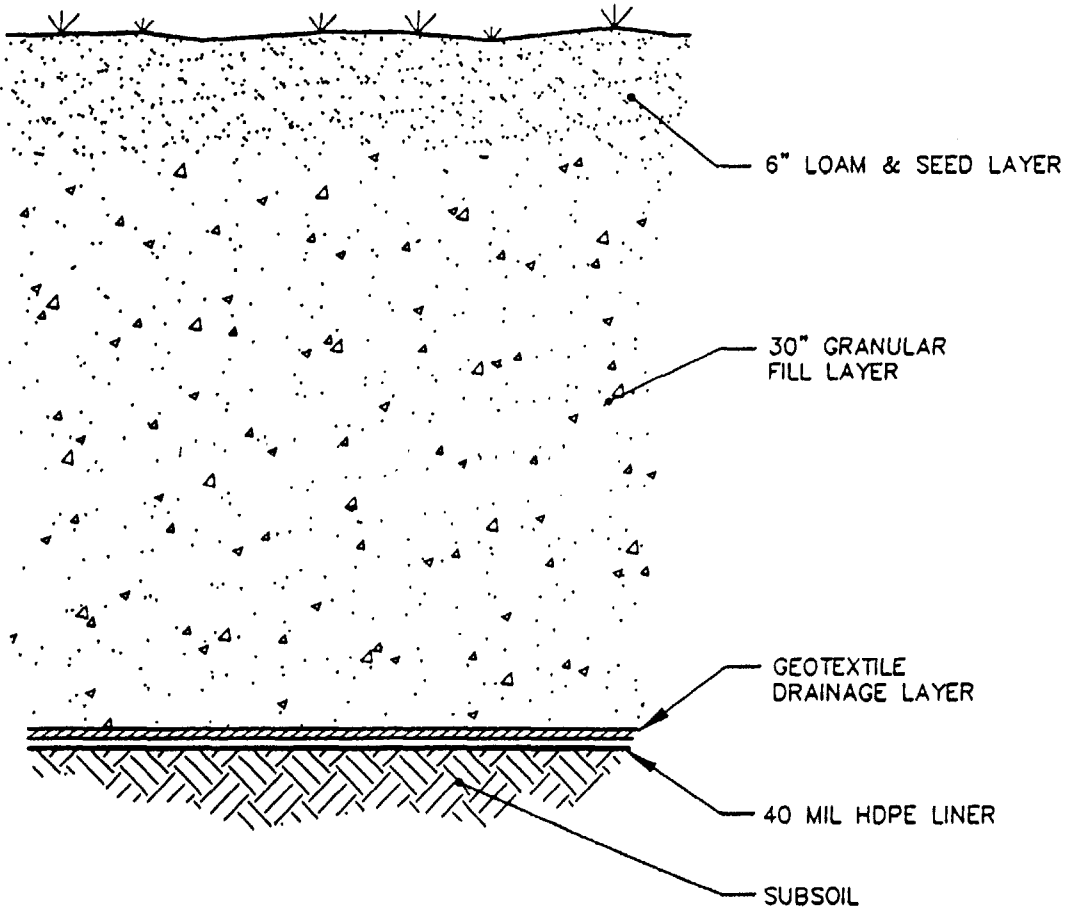
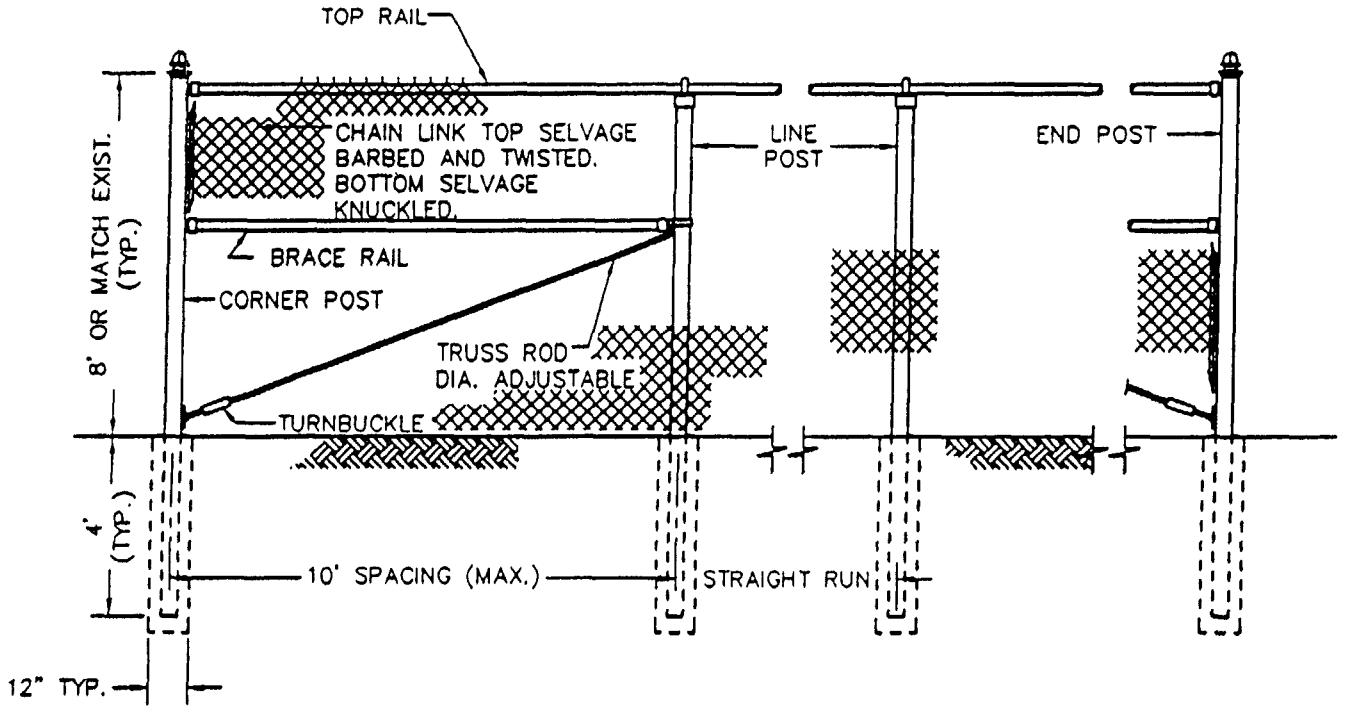


NOT TO SCALE

Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	DETAIL – COMPOSITE CAP	Feb. 14, 2001
Loureiro Engineering Associates, Inc.	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	DET 4 of 9

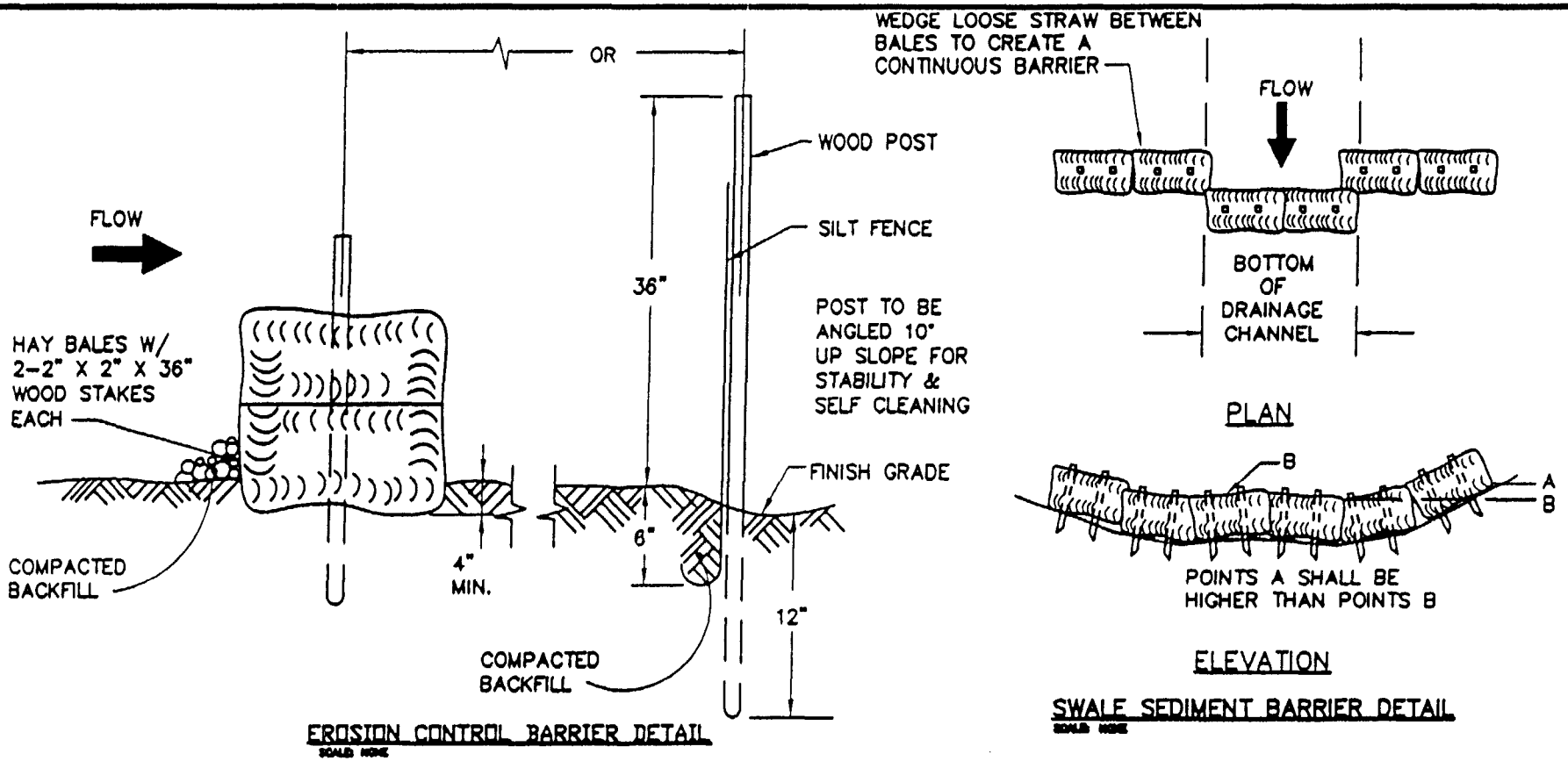
1002-DET5.dwg



NOT TO SCALE

Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	DETAIL – CHAIN LINK FENCE	Feb. 14, 2001
Loureiro Engineering Associates, Inc.	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK/WILLOW BROOK POND	DET 5 of 9

T002-DET-FENCE.dwg

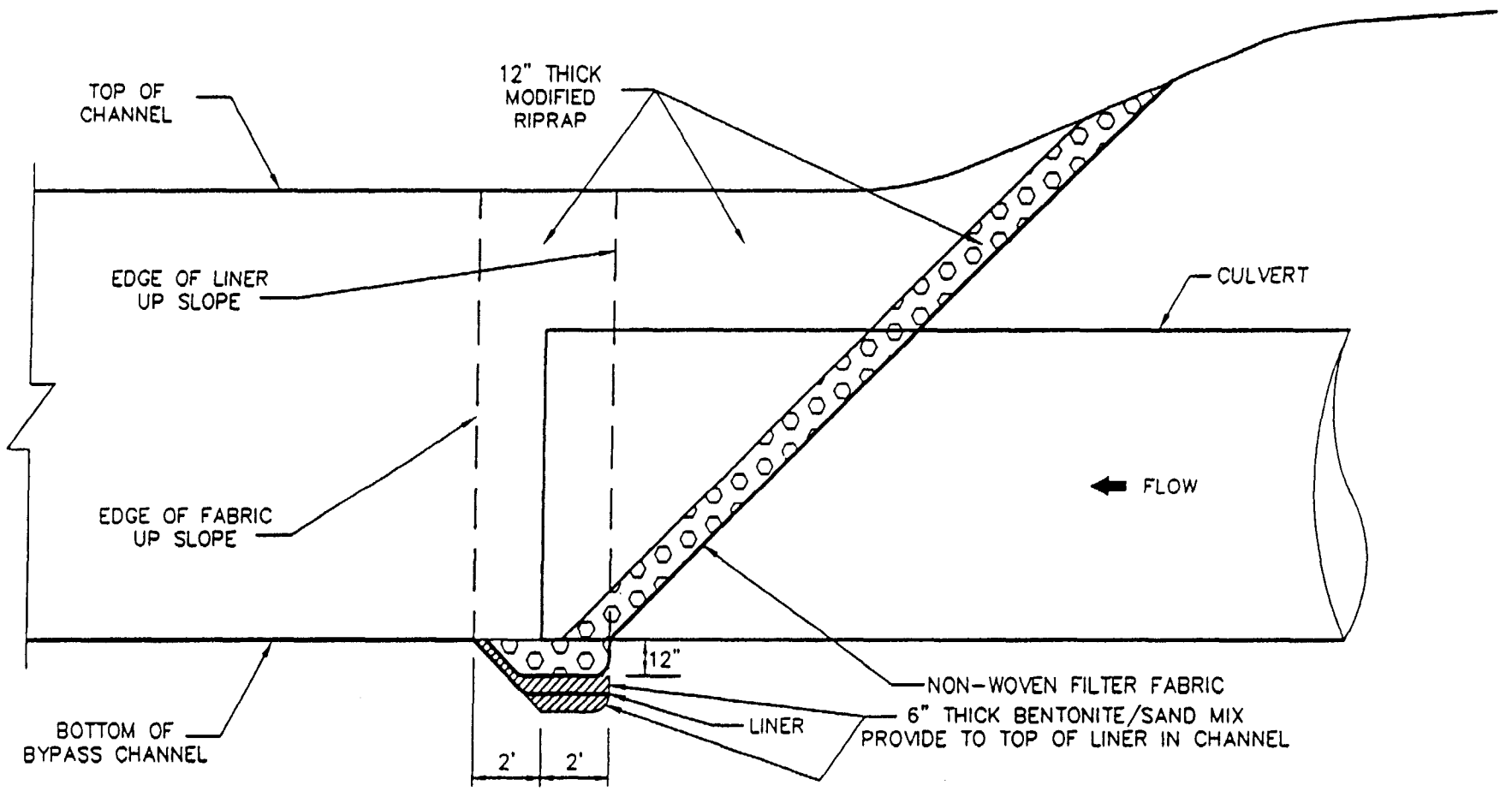


WHERE NEW CONSTRUCTION TAKES PLACE IN OR ADJACENT TO AN INLAND WETLANDS OR WATERCOURSE AREA, ALL NECESSARY PRECAUTIONS SHALL BE TAKEN TO AVOID DAMAGE TO THE NATURAL DRAINAGE AREAS AND INLAND WETLANDS. IN PARTICULAR, THE DISCHARGE OF SILT TO THE WETLANDS OR ANY WATER COURSE SHALL BE PREVENTED AND ALL APPLICABLE REGULATIONS OR REQUIREMENTS OF THE STATE DEPARTMENT OF ENVIRON- MENTAL PROTECTION, THE DEPARTMENT OF THE ARMY AND TOWN ORDINANCES SHALL BE ADHERED TO INCLUDING THE PLACEMENT OF EROSION CONTROL AND SEDIMENT BARRIERS. WHEN THE CONSTRUCTION WORK IS COMPLETED, THE CONTRACTOR SHALL CLEAN AND RESTORE THE NATURAL DRAINAGE AREAS AFFECTED BY HIS OPERATIONS TO THEIR ORIGINAL CONDITION.

IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MONITOR THE CONDITION OF THE EROSION CONTROL BARRIERS. IF THE EFFECTIVENESS OR INTEGRITY OF THE BARRIERS IS FOUND TO BE INSUFFICIENT OR IS DAMAGED IN ANY WAY, THE CONTRACTOR SHALL MAKE WHATEVER REPAIRS ARE NECESSARY TO ENSURE THAT PROPER EROSION CONTROL IS MAINTAINED. MONITORING OF THE EROSION CONTROL IS PARTICULARLY IMPORTANT IN THE AREAS WHERE EXCAVATION OR CONSTRUCTION IS TAKING PLACE OR FOLLOWING PERIODS OF RAINFALL. ALL REPAIRS TO THE EROSION CONTROL BARRIERS SHALL BE MADE BY THE CONTRACTOR AS SOON AS THE DAMAGE IS DISCOVERED.

Application by: UNITED TECHNOLOGIES CORPORATION PRATT & WHITNEY	DETAIL – EROSION CONTROLS	Feb. 14, 2001
Loureiro Engineering Associates, Inc.	Purpose: Remediation of Contaminated Soil/Sediment & Restoration WILLOW BROOK /WILLOW BROOK POND	DET 6 of 9

T002-DET-EROSION.dwg



NOT TO SCALE

Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

DETAIL – CULVERT TRANSITION AT BYPASS CHANNEL

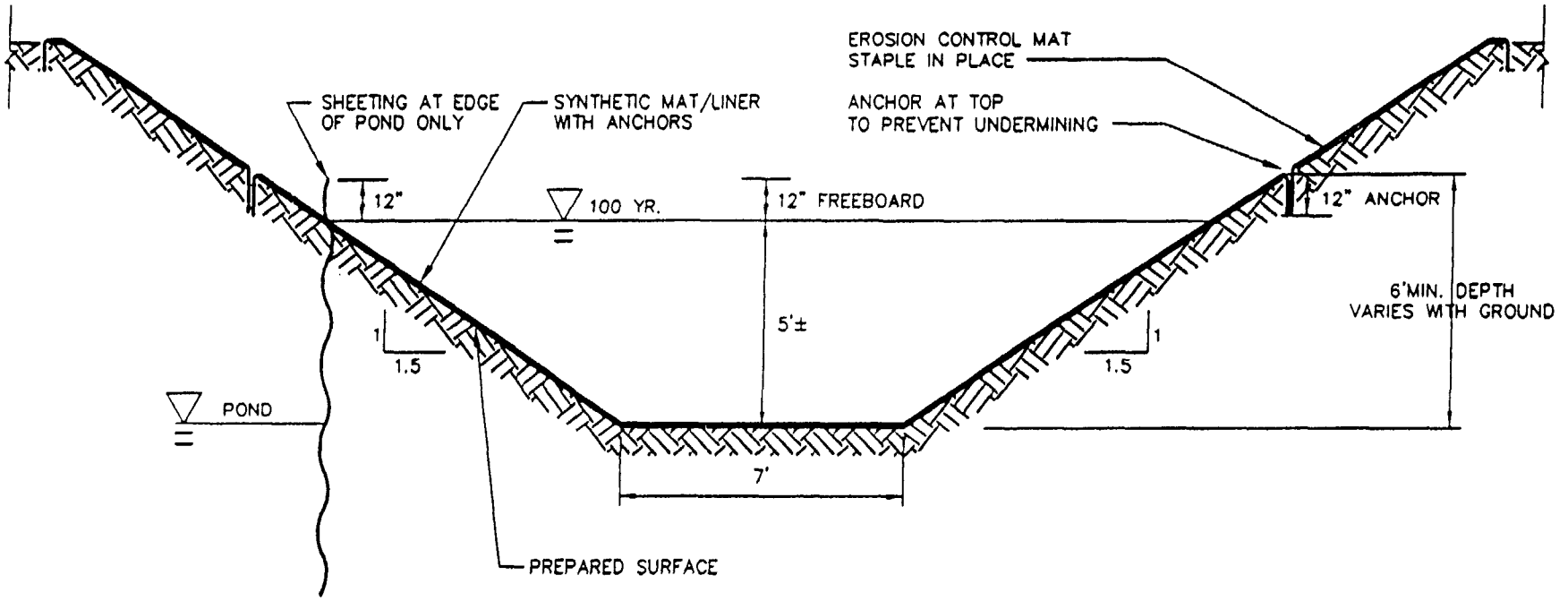
Feb. 14, 2001

Loureiro Engineering Associates, Inc.
100 Northwest Drive, Plainville, Conn. 06062

Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND

DET 7 of 9

BYPASS-DETAILS.dwg



NOT TO SCALE

Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

DETAIL – BYPASS CHANNEL

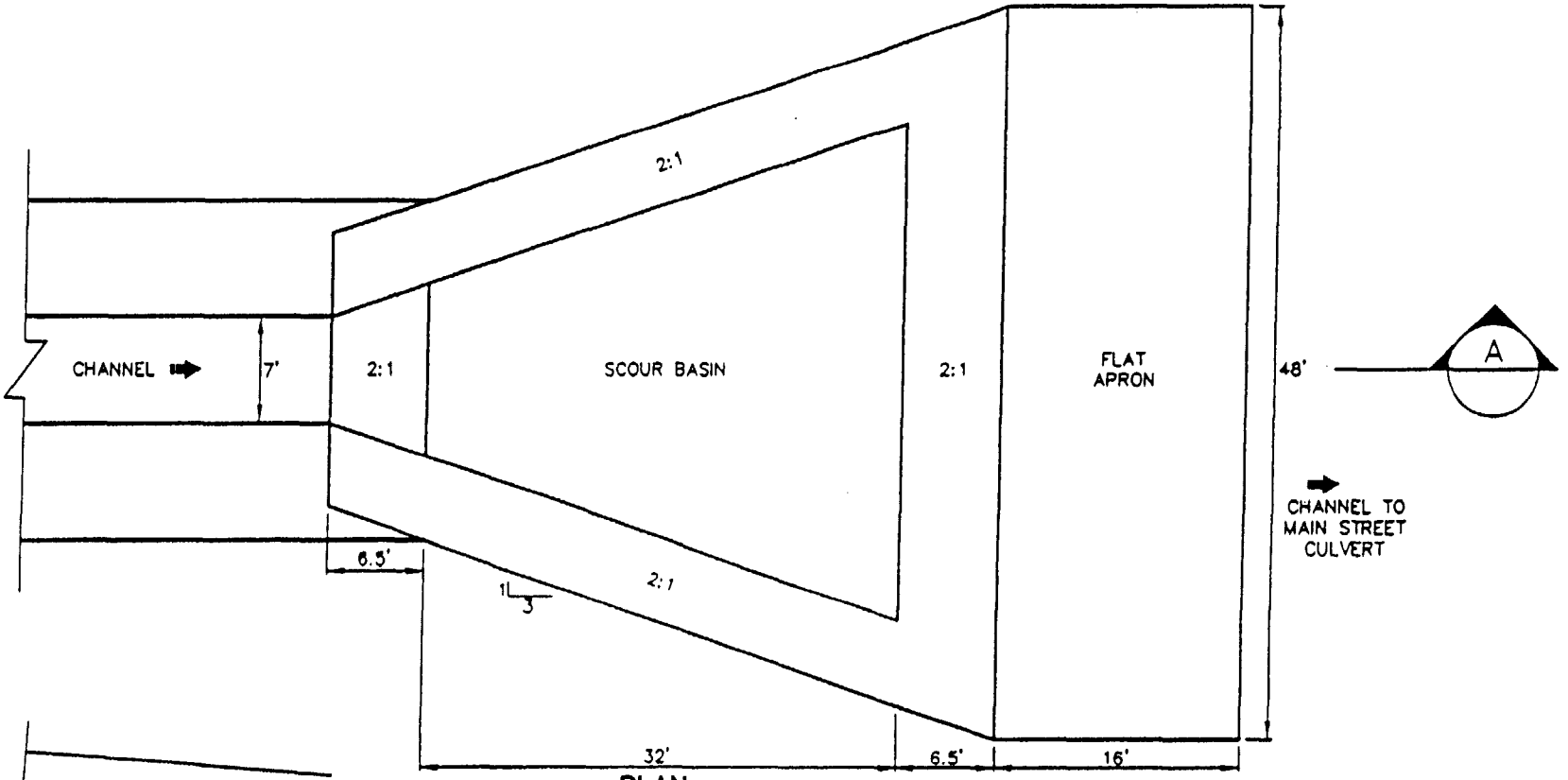
Feb. 14, 2001

Loureiro Engineering Associates, Inc.
100 Northwest Drive, Plainville, Conn. 06062
[illegible] Company 860-747-6181

Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND
MAIN STREET, EAST HARTFORD, HARTFORD COUNTY, CONNECTICUT

DET 8 of 9

BYPASS-DETAILS.dwg



NOT TO SCALE

Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

DETAIL – BYPASS CHANNEL ENERGY DISSIPATOR

Feb. 14, 2001

Loureiro Engineering Associates, Inc.
100 Northwest Drive, Plainville, Conn. 06062

Purpose: Remediation of Contaminated Soil/Sediment & Restoration
WILLOW BROOK/WILLOW BROOK POND
MAIN STREET, EAST HARTFORD, HARTFORD COUNTY, CONNECTICUT

DET 9 of 9

BYPASS-DETAILS.dwg

APPENDIX B

Willow Brook/Willow Brook Pond
PCB Remediation Project
Soil Scientist Report

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

Soil Science • Ecological Studies • Hazardous Waste Assessments • Project Planning • Soil & Water Testing

KENNETH C. STEVENS, Jr.
President

February 5, 2001

ATTN: Michael Sullivan
Loureiro Engineering Associates, Inc.
100 Northwest Drive
Plainville, CT 06062

Re: UTC, Pratt & Whitney, Willow Brook & Willow Brook Pond, East Hartford, CT
SS & ES Job # 2001-26-CT-EHT-1

Dear Mr. Sullivan:

In accordance with your request Soil Science and Environmental Services, Inc. conducted a site inspection on January 17, 2001 for the purpose of wetland identification. The project site is located in an urbanized area of the Town of East Hartford (Figure 1). Willow Brook flows through the site in a westerly direction and empties into the Connecticut River. In the eastern portion of the project area Willow Brook passes through two man-made ponds. The second and larger pond is referred to as Willow Brook Pond. Below Willow Brook Pond the water course flows through a marsh, then passes through a man-made, narrow ravine and into a large culvert under Main Street. The marsh may have historically been a pond which has become silted in over the years.

Wetlands are defined differently by the State of Connecticut and the Federal Government. According to Connecticut State Statutes, Inland Wetlands are defined as land, including submerged land, (but not tidal wetlands), which consist of any of the soil types designated as poorly drained, very poorly drained, alluvial and floodplain by the National Cooperative Soil Survey (Inland Wetlands and Watercourses Act, Sections 22a-36- through 22a-45 of the Connecticut General Statutes). The Federal Government defines wetlands as: "Those areas that are inundated or saturated by surface or ground water at a frequency and duration to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (Corps of Engineers Wetlands Delineation Manual, 1987). The methodology established by the Federal Government uses a three parameter approach utilizing hydrologic indicators, hydrophytic vegetation and hydric soils for identifying wetlands.

The floodplain and very poorly drained organic soils that were identified in the project site qualify as State of Connecticut Inland Wetlands (Figure 2). The floodplain soils situated adjacent to Willow Brook include the very poorly drained Saco silt loam (Sb) and the variable drained Fluvents and Fluvaquents (Fl). The shallow organic soil found in the marsh was identified

545 Highland Avenue • Route 10 • Cheshire • Connecticut • 06410 • (203) 272-7837 • Fax (203) 272-6698

as very poorly drained Peats and Mucks (Pk). Some portions of the marsh may contain deeper layers of peats and mucks. The limits of the Inland Wetlands were delineated with consecutively numbered, orange survey tapes. Short descriptions of the soil map units found in the project area are presented in the Soil Report (Appendix I).

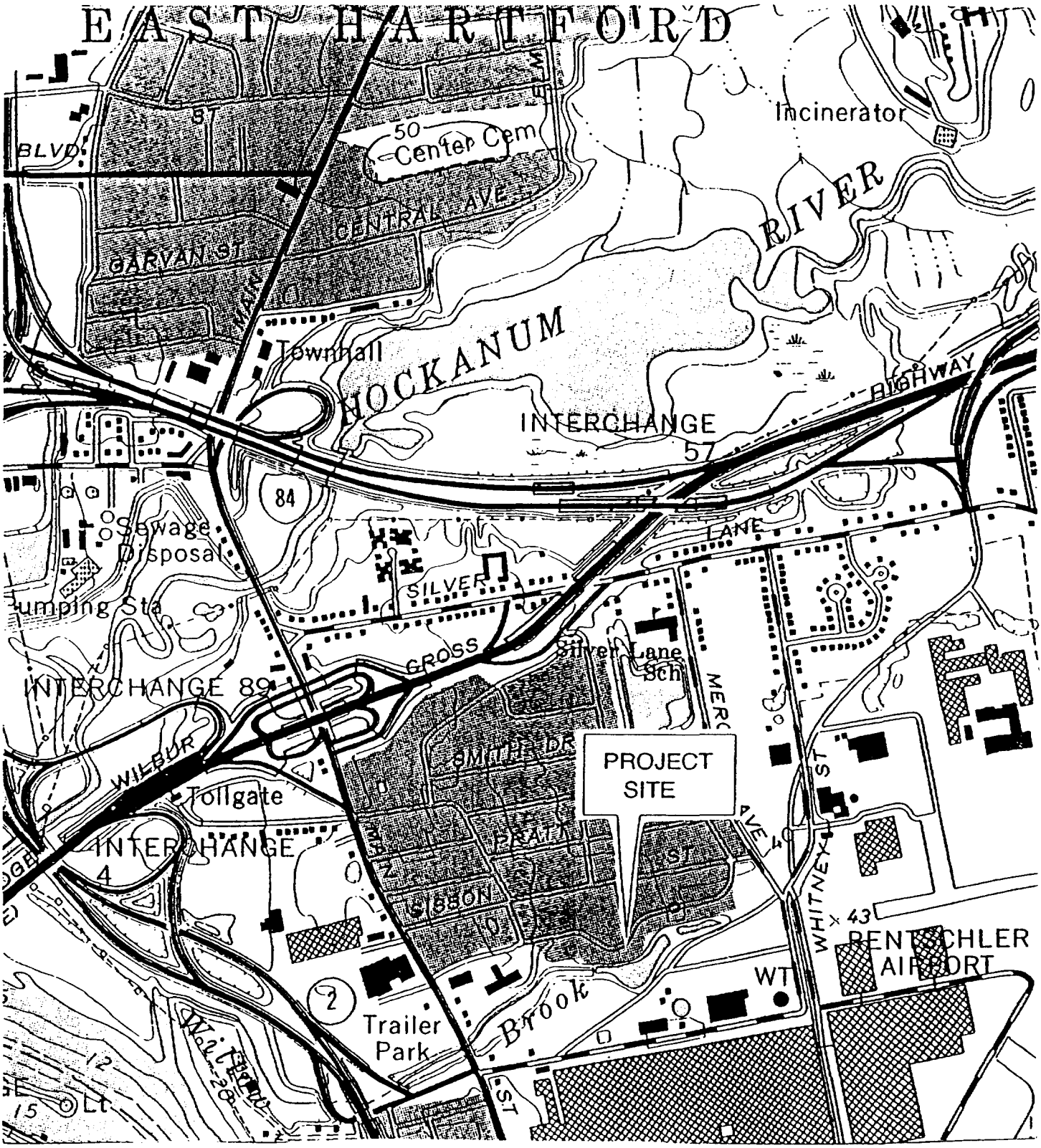
Federal Wetlands are present downstream of Willow Brook Pond (Figure 3). Most of the area qualifying as Federal Wetlands consists of marsh that is dominated by cattail and purple loosestrife. Along the edges of the marsh the wetlands consist of a mixture of trees, shrubs and herbaceous plants. Woody species within the Federal Wetlands include black willow, sycamore, pin oak, American elm, black gum, red maple, cottonwood, boxelder, catalpa, northern arrowwood viburnum, elderberry, buttonball bush and silky dogwood. Besides cattails and loosestrife, other herbaceous plants identified in the Federal Wetlands include jewelweed, rice cutgrass, willow herb, asters, sedges and rushes. The limits of the Federal Wetlands were delineated with consecutively numbered, blue survey tapes. Two data plot transects were established to document the vegetation, soils and hydrologic indicators that were found along the Federal Wetlands boundary. Two Federal Data Plot Transects were established to document the vegetation, soils and hydrologic indicators that were found along the Federal Wetlands boundaries. The information collected from each data plot is presented in Appendix II. The approximate locations of the Federal Data Plots are shown in Figure 3.

Respectfully submitted,

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

Thomas W. Pietras

Thomas W. Pietras
Professional Wetland and Soil Scientist



Project Location Map for Willow Brook & Willow Brook Pond, UTC, Pratt & Whitney, East Hartford, CT

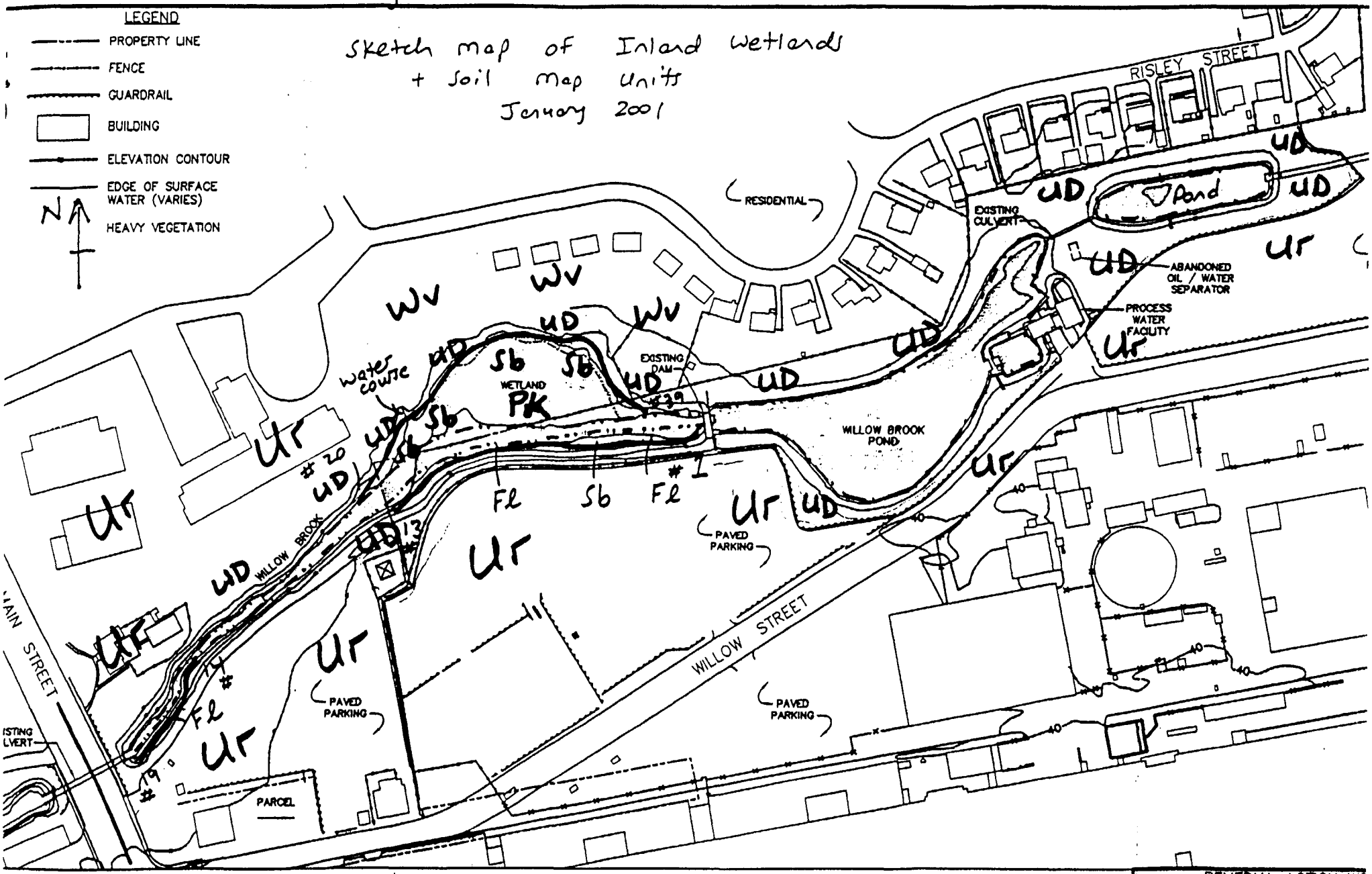
FIG. 1

SCALE: 1" = 1000'

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

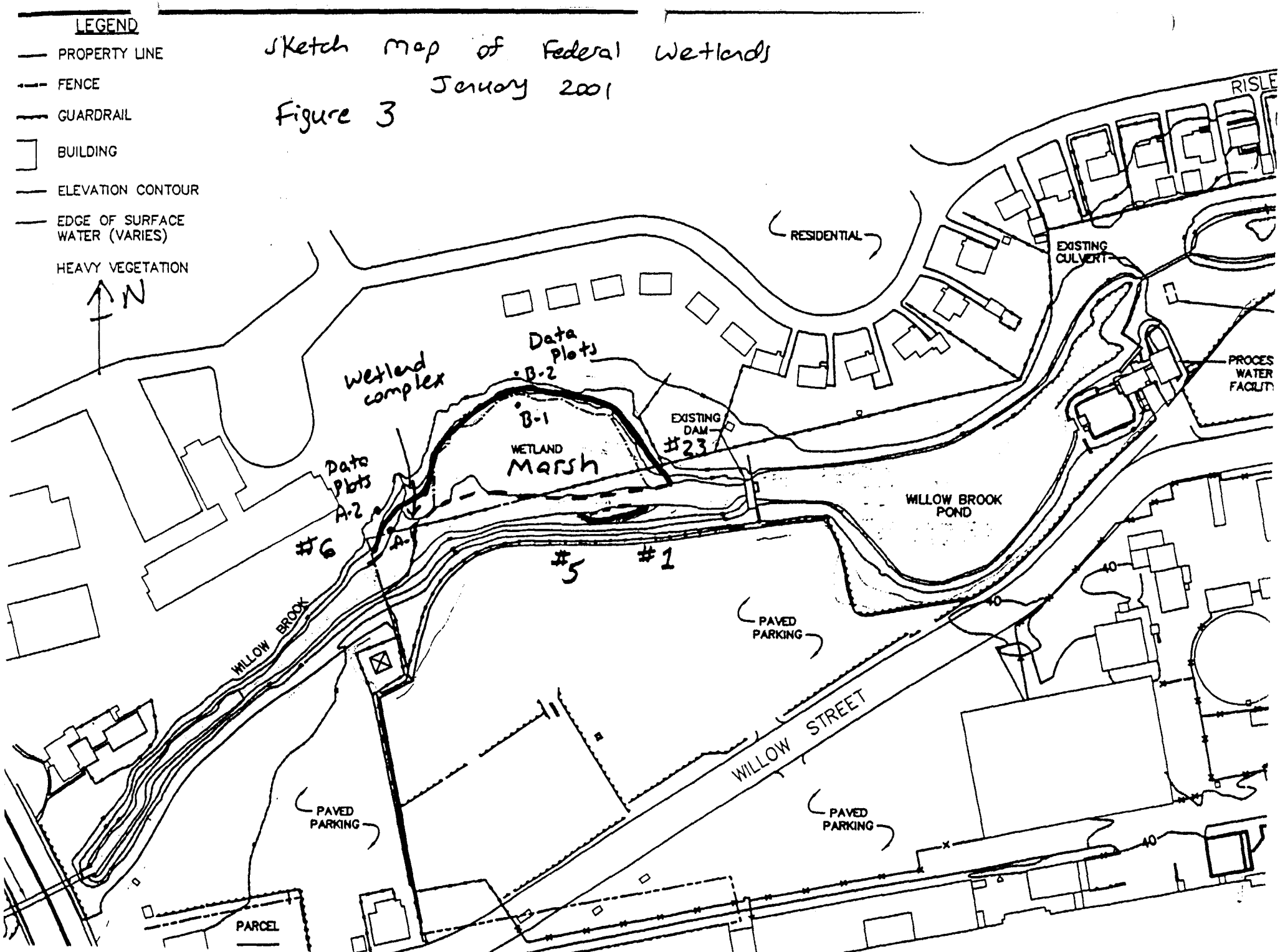
DATE: February 2001

Figure 2



REMEDIAL ACTION WC
UTC\P & W, Willow Brook & Mo

Sketch map of Federal Wetlands
January 2001
Figure 3



APPENDIX I

SOIL REPORT

Willow Brook & Willow Brook Pond

UTC, Pratt & Whitney

East Hartford, CT

February 2001

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

545 Highland Avenue • Route 10 • Cheshire • Connecticut • 06410 • (203) 272-7837 • Fax (203) 272-6698

SOIL REPORT

TO: Loureiro Engineering Associates, Inc.
100 Northwest Drive
Plainville, CT 06062

SSS Job No. 2001-26-CT-EHT-1
Client Job No. _____
Site Inspection Date January 17, 2001

PROJECT TITLE AND LOCATION UTC/Pratt & Whitney, Willow Brook & Willow Brook Pond, East Hartford, CT

PROJECT DESCRIPTION: *Inland wetland identification and classification of soils*

METHOD FOR IDENTIFICATION OF MAP UNITS

Wetlands

[X] *Field marking (flagging) for survey.*

[X] *Field plotting on* site plan *, scale:* 1"=150' *, contour:* 5 ft .

[ ] *Field plotting on aerial photography.*

Non Wetland Soils

[X] *High intensity field identification by Soil Scientist.*

[ ] *Medium intensity identification from USDA, Soil Conservation Service Soil Maps.*

METHOD OF SOIL IDENTIFICATION

[X] *Spade and Auger*

[ ] *Deep test pits (backhoe)*

[ ] *Other* _____

SOIL MOISTURE CONDITION

[ ] *Dry* [X] *Moist* [ ] *Wet*

Frost Depth 0 to 6 *in.*

Snow Depth 2 to 12 *in.*

The classification system of the National Cooperative Soil Survey, USDA, Soil Conservation Service and the County Identification Legend were used in this investigation. The investigation was conducted by the undersigned Certified Soil Scientist.

All wetland boundary lines established by the undersigned Soil Scientist are subject to change until officially adopted by local, state or federal regulatory agencies.

Respectively submitted by

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

Thomas W. Pietras

Soil Scientist
Field Investigator
Thomas W. Pietras

Approved by

Kenneth C. Stevens, Jr.
Principal Soil Scientist

See attached page(s)

SOIL REPORT *continued*

PROJECT TITLE: UTC/Pratt & Whitney, Willow Brook & Willow Brook Pond, East Hartford, CT

MAPS/PLANS TRANSMITTED TO CLIENT

- [xx] Sketch location of Wetlands and other Soil Types.
- [ ] None

NUMBERING SEQUENCE OF WETLAND BOUNDARY LINE MARKERS

1 THRU 13 14 THRU 19 20 THRU 38

SUMMARY SOIL DESCRIPTIONS

WETLAND SOILS

Fluvaquent and Fluvents (Fl). This soil mapping unit consists of relatively recently formed, floodplain soils of varaible drainage classes. They range from very poorly drained to excessively drained. Fluvaqents and Fluvents are commonly found in disturbed landscapes where two or more feet of the original soil surface has been filled over or excavated. Fluvaquents are very poorly to poorly drained and are subject to prolonged periods of satuation and frequent flooding. Fluvents are better draining and are commonly subject to flooding for short periods, mainly in the spring.

Peats and mucks, deep (Pk). This is a very poorly drained, deep organic soil. The soil is now mapped in Connecticut as the Carlisle muck.

Saco silt loam (Sb). This is a very poorly drained, medium over coarse textured, friable over loose alluvial soil developed on floodplains.

NONWETLAND SOILS

Udorthents, smoothed (UD). This is a well to moderately well drained disturbed soil that has had two (2) feet or more of its original soil surface excavated or filled. In Hartford County it was previously mapped within the Made land (Ma) soil map unit.

Urban land (Ur). This unit consists of areas where urban structures such as buildings, roads and parking lots, cover more than 85 percent of the surface. In Hartford County it was previously mapped within the Made land (Ma) soil map unit.

Windsor loamy fine sand (Wv). This is a deep, excessively drained, moderately coarse over coarse textured, friable over loose, glacial fluvial (outwash) soil.

For further information, refer to Hartford County Soil Survey.

LEGEND

- PROPERTY LINE
- FENCE
- GUARDRAIL
- BUILDING
- ELEVATION CONTOUR
- EDGE OF SURFACE WATER (VARIES)
- HEAVY VEGETATION

Sketch map of Inland Wetlands + Soil Map Units
January 2001

RISLEY STREET
EXISTING UNDERGROUND PIPE
RESIDENTIAL
EXISTING CULVERT
Pond
UD
Ur
PAVED PARKING
ABANDONED OIL / WATER SEPARATOR
PROCESS WATER FACILITY
Wv
water course
Sb
WETLAND
PK
EXISTING DAM
#39
#1
#20
#13
#19
Fl
WILLOW BROOK
WILLOW BROOK POND
MAIN STREET
WILLOW STREET
EXISTING CULVERT
PARCEL
40

0 150' 300'
GRAPHIC SCALE

NOTES:

1. BASE MAP FROM ELECTRONIC FILE OF LOUREIRO ENGINEERING ASSOCIATES, P.C. DRAWING, DATED 12/1/98 AND FROM USGS AERIAL PHOTOGRAPHY, 1994.

REMEDIAL ACTION WORK PLAN
UTC\P & W. Willow Brook & Willow Brook Pond

EXISTING SITE PLAN

Comm.No. 88UT002.001

FIGURE 1-2

LEA

88UT002-F10-2.dwg

Sketch map of Federal Wetlands
January 2001

LEGEND

- PROPERTY LINE
- FENCE
- GUARDRAIL
- BUILDING
- ELEVATION CONTOUR
- EDGE OF SURFACE WATER (VARIES)
- HEAVY VEGETATION

RISLEY STREET
EXISTING UNDERGROUND PIPE
RESIDENTIAL
EXISTING CULVERT
ABANDONED OIL / WATER SEPARATOR
PROCESS WATER FACILITY
PAVED PARKING
Wetland complex
Data Plots B-2
B-1
WETLAND Marsh
EXISTING DAM #23
Data Plots A-2
A-1
#6
#5
#1
WILLOW BROOK POND
WILLOW BROOK
MAIN STREET
WILLOW STREET
EXISTING CULVERT
PARCEL
40

0 150' 300'
GRAPHIC SCALE

NOTES:

1. BASE MAP FROM ELECTRONIC FILE OF LOUREIRO ENGINEERING ASSOCIATES, P.C. DRAWING, DATED 12/1/98 AND FROM USGS AERIAL PHOTOGRAPHY, 1994.

REMEDIAL ACTION WORK PLAN
UTC\P & W, Willow Brook & Willow Brook Pond

EXISTING SITE PLAN

Comm.No. 88UT002.001

FIGURE 1-2

LEA

88UT002-F10-2.dwg

APPENDIX II

FEDERAL WETLAND DATA FORMS

Willow Brook & Willow Brook Pond

UTC, Pratt & Whitney

East Hartford, CT

February 2001

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

PROJECT TITLE: UTC, Pratt + Whitney, Wilbw Brook + Willow Brook Pond, East Hartford, CT TRANSECT: A PLOT: 1

DELINEATOR(S): Thomas W. Pietras, SS+ES, Inc. DATE: January 17, 2001

VEGETATION — STRATUM and SPECIES (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
trees			
Quercus rubra	420/1062	40%	FACU-
Acer rubrum	380/1062	36	FAC
Betula populifolia	262/1062	25	FAC
lianas			
Vitus sp.	20.5/20.5	100%	-
saplings			
Betula populifolia	10.5/13.5	78%	FAC
Prunus serotina	3/13.5	22	FACU
shrubs			
Cornus amomum	20.5/23.5	87%	FACW
Salix nigra NA	3/23.5	13	FACW-
herbaceous			
Cornus amomum	20.5/37	55%	FACW
Lythrum salicaria	10.5/37	28	FACW+
Leersia oryzoides	3/37	8	OBL
Epilobium coloratum	3/37	8	OBL

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	* OTHER HYDROPHYTES		FAC-	FACU	UPL	
0	4	3	0	Hydrophytes SUBTOTAL: 7	0	2	0	NON-hydrophytes SUBTOTAL: 2

100 x Subtotal Hydrophytes / (Subtotal Hydrophytes + Subtotal NON-hydrophytes) = PERCENT HYDROPHYTES = 78%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification: _____
- Aerial Photograph — Identification: _____
- Other — Identification: _____

☒ NO RECORDED DATA

☒ OBSERVATIONS:

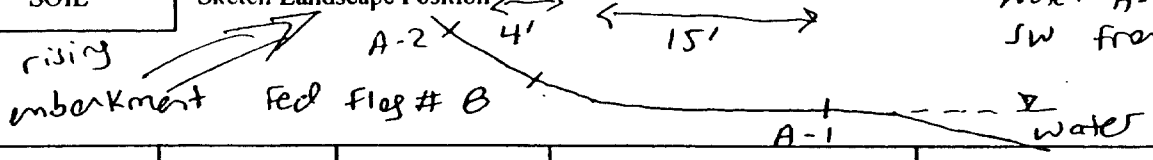
Depth to Free Water: 1 inch
Depth to Saturation (including capillary fringe): 0
Describe Altered Hydrology:

☐ Inundated ☒ Saturated in upper 12 inches ☒ Water Marks ☐ Drift Lines ☒ Sediment Deposits ☒ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL

Sketch Landscape Position



Note: A-1 is approx 100 SW from storm sewer outfall pi

DEPTH inches	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, e
0-40	OA	10YR 2/1		mucky silt loam + soft muck (mix of alluvial deposition + organic formation)

HYDRIC SOIL INDICATOR(S): III B

REFERENCE: NEIWPCC. May 1995. Field Indicators for Identifying Hyd Soils in New England.

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP: medisaprists / Humaquepts

SOIL DRAINAGE CLASS: very poorly (A2)

DEPTH TO ACTIVE WATER TABLE::

NTCHS HYDRIC SOIL CRITERION: A2

REFERENCE: Soil Survey Staff. 1997. Keys to Soil Taxonomy, 7th edition

REFERENCE: USACOE, New England. 1991. Soil Drainage Classes.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	X	
Hydric Soils Criterion Met?	X	
Wetland Hydrology Met?	X	

	Yes	No
IS THIS DATAPOINT WITHIN A WETLAND?	X	

REMARKS:

PROJECT TITLE: UTC, Willow Brook, East Hartford, CT

TRANSECT: A

PLOT: 1

PROJECT TITLE: UTC, Pratt + Whitney, Willow Brook + Willow Brook Pond, East Hartford, CT TRANSECT: A PLOT: 2

DELINEATOR(S): Thomas W. Pietras, SST ES, Inc. DATE: January 17, 2001

VEGETATION — STRATUM and SPECIES (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
trees			
Quercus rubra	1305/1947	67%	FACU-
Acer rubrum	380/1947	20	FAC
NA - Betula populifolia	262/1947	13	FAC
lianas			
Vitus sp.	20.5/20.5	100%	-
saplings			
Prunus serotina	20.5/20.5	100%	FACU
shrubs			
Acer platanoides NI	10.5/21	50%	NI
Prunus serotina	10.5/21	50	FACU
herbeceous			
Prunus serotina	20.5/31	66%	FACU
Rosa multiflora	10.5/31	34	FACU

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	* OTHER HYDROPHYTES	
0	0	1	0	Hydrophytes SUBTOTAL: 1

FAC-	FACU	UPL	
0	5	0	NON-hydrophytes SUBTOTAL: 5

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal NON-hydrophytes = PERCENT HYDROPHYTES = 16%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification: _____
- Aerial Photograph — Identification: _____
- Other — Identification: _____

☐ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: 38 inches
Depth to Saturation (including capillary fringe): 33 inches
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position

See Data Plot A-1

DEPTH inches	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water,
0-2	A	7.5YR 3/2		sandy loam
2-36	C_1	7.5YR 3/3		sandy loam (fill)
36-42	C_2	mix of 7.5YR 3/3, 7.5YR 2/2 + 7.5YR 4/3		sandy loam (mixed soil)

HYDRIC SOIL INDICATOR(S)

REFERENCE:

NEIWPCC. May 1995. Field Indicators for Identifying Hy Soils in New England.

OPTIONAL SOIL DATA:

REFERENCE:

TAXONOMIC SUBGROUP: Udorthents

Soil Survey Staff. 1997. Keys to Soil Taxonomy, 7th editio

SOIL DRAINAGE CLASS: well drained (E)

USACOE, New England. 1991. Soil Drainage Classes.

DEPTH TO ACTIVE WATER TABLE::

NTCHS HYDRIC SOIL CRITERION:

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☒
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

	Yes	No
IS THIS DATAPOINT WITHIN A WETLAND?	☐	☒

REMARKS:

PROJECT TITLE: UTC, Willow Brook, East Hartford, CT

TRANSECT: A

PLOT: 2

PROJECT TITLE: UTC, Pratt + Whitney, Wilbw Brook + Wilbw Brook Pond, East Hartford, CT TRANSECT: B PLOT: 1

DELINEATOR(S): Thomas W. Pietras, SSTES, Inc. DATE: Jenuay 17, 2001

VEGETATION — STRATUM and SPECIES (Dominants Only)		Dominance Ratio	Percent Dominance	NWI STATUS
trees				
Nyssa	sylvatica	155/155	100%	FAC
lianas	–			
saplings				
Acer	rubrum	20.5/20.5	100%	FAC
shrubs				
Sambucus	canadensis	10.5/10.5	100%	FACW
herbaceous				
Typha	latifolia	38/100	38%	OBL
Lythrum	salicaria	20.5/100	20	FACW
Leersia	oryzoides	20.5/100	20	OBL
Carex	scoparia	10.5/100	10	OBL
grasses	NA	10.5/100	10	–

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	* OTHER HYDROPHYTES	FAC-	FACU	UPL
2	2	2	0	0	0	0

Hydrophytes SUBTOTAL: 6 NON-hydrophytes SUBTOTAL: 0

100 x Subtotal Hydrophytes / (Subtotal Hydrophytes + Subtotal NON-hydrophytes) = PERCENT HYDROPHYTES = 100%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification: _____
- Aerial Photograph Identification: _____
- Other Identification: _____

☒ NO RECORDED DATA

☒ OBSERVATIONS:

Depth to Free Water: 8
Depth to Saturation (including capillary fringe): _____
Describe Altered Hydrology: _____

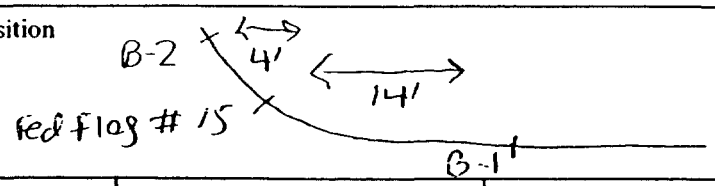
☐ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☒ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL

Sketch Landscape Position

steep bank



DEPTH inches	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water,
0-40	Oa	10YR 2/1		muck

HYDRIC SOIL INDICATOR(S): III A

REFERENCE: NEIWPCC. May 1995. Field Indicators for Identifying Hy Soils in New England.

OPTIONAL SOIL DATA:

REFERENCE:

TAXONOMIC SUBGROUP: Mediaquists

Soil Survey Staff. 1997. Keys to Soil Taxonomy, 7th editio

SOIL DRAINAGE CLASS: very poorly (A1)

USACOE, New England. 1991. Soil Drainage Classes.

DEPTH TO ACTIVE WATER TABLE::

NTCHS HYDRIC SOIL CRITERION: A1

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	X	
Hydric Soils Criterion Met?	X	
Wetland Hydrology Met?	X	

	Yes	No
IS THIS DATAPOINT WITHIN A WETLAND?	X	

REMARKS:

PROJECT TITLE: UTC, Willow Brook, East Hartford, CT

TRANSECT: B PLOT: 1

PROJECT TITLE: UTC, Pratt + Whitney, Willow Brook + TRANSECT: B PLOT: 2
Willow Brook Pond, East Hartford, CT

DELINEATOR(S): Thomas W. Pietras, SS+ES, Inc. DATE: January 17, 2001

VEGETATION — STRATUM and SPECIES (Dominants Only)		Dominance Ratio	Percent Dominance	NWI STATUS
trees				
Nyssa sylvatica		909/2144	42%	FAC
Quercus rubra		715/2144	33	FACU
Acer rubrum		492/2144	23	FAC
Prunus serotina	NA	28/2144	1	FACU
lianas				
Vitis sp.		20.5/22.5	100%	–
saplings				
Nyssa sylvatica		10.5/21	50%	FAC
Prunus serotina		10.5/21	50	FACU
shrubs				
Sambucus canadensis		10.5/13.5	78%	FACW
Nyssa sylvatica		3/13.5	22	FAC
herbaceous				
Impatiens capensis		10.5/16.5	63%	FACW
Polygonum cuspidatum	NA	3/16.5	18	FACU
3 grasses		3/16.5	18	–

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	* OTHER HYDROPHYTES	FAC-	FACU	UPL
0	2	4	0	0	2	0

Hydrophytes SUBTOTAL: 6 NON-hydrophytes SUBTOTAL: 2

100 x Subtotal Hydrophytes / (Subtotal Hydrophytes + Subtotal NON-hydrophytes) = PERCENT HYDROPHYTES = 75%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- Other — Identification:

☒ NO RECORDED DATA

☒ OBSERVATIONS:

Depth to Free Water: none
Depth to Saturation (including capillary fringe): none
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position

see Data Plot B-1

DEPTH inches	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, e
A	0-10	7.5YR 2/2		fine sandy loam
C	10-23	mix of 7.5YR 3/3 + 7.5YR 2/2		stony sandy loam + fine sandy loam (fill + re-worked soil

HYDRIC SOIL INDICATOR(S)

REFERENCE:

NEIWPCC. May 1995. Field Indicators for Identifying Hy Soils in New England.

OPTIONAL SOIL DATA:

REFERENCE:

TAXONOMIC SUBGROUP: Udorthents

Soil Survey Staff. 1997. Keys to Soil Taxonomy, 7th editio

SOIL DRAINAGE CLASS: well drained (E)

USACOE, New England. 1991. Soil Drainage Classes.

DEPTH TO ACTIVE WATER TABLE::

NTCHS HYDRIC SOIL CRITERION:

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	X	
Hydric Soils Criterion Met?		X
Wetland Hydrology Met?		X

	Yes	No
IS THIS DATAPOINT WITHIN A WETLAND?		X

REMARKS:

PROJECT TITLE: UTC, Willow Brook, East Hartford, CT

TRANSECT: B

PLOT: 2

APPENDIX C

Willow Brook/Willow Brook Pond
PCB Remediation Project
Proposed Habitat/Restoration Plantings

Trees

Black Gum	*Nyssa slyvatica*
Black Willow	*Salix discolor*
Green Ash	*Fraxinus pensylvanica*
White Pine	*Pinus strobus*

Small Trees

Shadblow	*Amelanchier canadensis*
American Hazelnut	*Corylus americana*
Speckled Alder	*Alnus rugosa*
Purple-osier Willow	*Salix purpurea**
Silky Willow	*Salix sericea*

Shrubs

Elderberry	*Sambucus canadensis*
Buttonbush	*Cephalanthus occidentalis*
Highbush Blueberry	*Vaccinium corymbosum*
Gray Dogwood	*Cornus racemosa*
Mountain Laurel	*Kalmia latifolia*
Silky Dogwood	*Cornus ammomum*
Nannyberry	*Viburnum lentago*
Winterberry	*Ilex verticillata*
Pussy Willow	*Salix discolor*
Bayberry	*Myrica pensylvanica*

Emergents

Bur-reed	*Sparganium androcladum*
Tussock Sedge	*Carex stricta*
Wool Grass	*Scirpus cyperinus*
River Bulrush	*Scirpus fluviatilis*
Sweetflag	*Acorus calamus*
Water-willow	*Decodon verticillatus*
Blueflag	*Iris versicolor*
Pickerelweed	*Pontedaria cordata*
Grass-leafed Arrowhead	*Sagittaria graminea*
Water celery	*Vallisnaria americana*

Pond and Stream Edge

Fox sedge	*Carex vulpinoides*
Fringed sedge	*Carex crinita*

Soft rush	*Juncus effusus*
Blueflag	*Iris versicolor*
Cardinal Flower	*Lobelia cardinalis*
Joe-Pye Weed	*Eupatorium maculatus*
Rice cutgrass	*Leersia oryizoides*
Swamp milkweed	*Asclepias incarnata*
Blue vervain	*Verbena hastate*

* Not native to New England

Note: Only plant materials native and indigenous to the region shall be used with the exception of *Salix purpurea*, which will be used for the bank stabilization of high-energy areas.

APPENDIX D

Willow Brook/Willow Brook Pond
PCB Remediation Project
Potential Substitute Plant Materials

POTENTIAL SUBSTITUTE PLANT MATERIALS

Trees

Red Maple	*Acer rubrum*
Sweetgum	*Liquidamber sylvatica*
Sycamore	*Platanus occidentalis*

Small Trees

Smooth Alder	*Alnus serratula*

Shrubs

Arrow-wood	*Viburnum recognitum*
Sweet Pepperbush	*Clethra alnifolia*
Red-osier Dogwood	*Cornus sericea*

Emergents

Giant Bur-reed	*Sparganium eurycarpum*
Hardstem Bulrush	*Scirpus acutus*
Three-square Bulrush	*Scirpus pungens*
Duck Potato	*Sagittaria latifolia*
Arrow Arum	*Peltandra virginica*

Pond and Stream Edge

Tussock Sedge	*Carex stricta*
Monkey Flower	*Mimulus ringens*
Boneset	*Eupatorium perfoliatum*

Pratt & Whitney
400 Main Street
East Hartford, CT 06108

Pratt & Whitney
A United Technologies Company

September 20, 2002

State of Connecticut
Department of Environmental Protection
Bureau of Water Management
Inland Water Resources Division
79 Elm Street
Hartford, CT 06106-5127

Attn: Ms. Denise Ruzicka

RE: 401 Water Quality Certification Permit No. WQC-200100497
United Technologies Corporation
Pratt & Whitney Division
As-Built Documentation

Dear Ms. Denise Ruzicka:

I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify, based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, that the submitted information is true, accurate and complete to the best of my knowledge and belief. I understand that any false statement made in the submitted information is punishable as a criminal offense under §53-a-157b of the Connecticut General Statues and any other applicable law.

Sincerely,

UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY DIVISION

Lorin Sodell

Chief Manufacturing Engineer
Director, Facilities & Services

Attachment

cc: Lauren Levine, UTC
Brian Cutler, LEA
Cori Rose, ACOE

Loureiro Engineering Associates, Inc.

September 20, 2002

State of Connecticut
Department of Environmental Protection
Bureau of Water Management
Inland Water Resources Division
79 Elm Street
Hartford, CT 06106-5127

Attn: Ms. Denise Ruzicka

RE: 401 Water Quality Certification Permit No. WQC-200100497
United Technologies Corporation
Pratt & Whitney Division
As-Built Documentation

Dear Ms. Denise Ruzicka:

In accordance with Paragraph 5 of the Special Conditions included in the above referenced Water Quality Certification, attached please find the As-Built Documentation Package for the wetland and watercourse mitigation activities associated with the above site. In accordance with Paragraph 7 of the General Terms and Conditions in the above referenced Water Quality Certification, I hereby certify that:

I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify, based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, that the submitted information is true, accurate and complete to the best of my knowledge and belief. I understand that any false statement made in the submitted information is punishable as a criminal offense under §53-a-157b of the Connecticut General Statues and any other applicable law.

If you should have any questions or comments, please contact me or Lauren Levine of United Technologies Corporation at (860) 728-6520.

Sincerely,

LOUREIRO ENGINEERING ASSOCIATES, INC.

Brian A. Cutler, P.E., L.E.P.
Vice President

Attachment

Table of Contents

1. INTRODUCTION

This document was prepared along with the attached drawings to document the as-built conditions at the Willow Brook/Willow Brook Pond PCB Remediation Project at the United Technologies Corporation (UTC), Pratt & Whitney (P&W) manufacturing facility in East Hartford, Connecticut (Site). The primary focus of this document is to summarize the wetland and watercourse restoration activities and present documentation of construction in accordance with the plans and specifications submitted with various permit applications to the Town of East Hartford Wetlands Commission, The State of Connecticut Department of Environmental Protection, Inland Water Resources Division (DEP IWRD) and the United States Department of the Army, Corps of Engineers (ACOE).

The data summarized herein specifically documents the construction methods, materials and vegetative products used in the restoration efforts at the subject site. Future activities including monitoring, maintenance, record keeping and reporting are also briefly summarized herein.

2. GENERAL SUMMARY OF THE PROJECT AND VARIOUS MILESTONE ACHEIVEMENTS

The project activities consisted of the excavation and offsite disposal of soil and sediment from within and immediately surrounding Willow Brook and Willow Brook Pond that contained polychlorinated biphenyls (PCBs) at concentrations greater than 25 milligram per kilogram (mg/kg or parts per million (ppm)). Following excavation, a geotextile, soil and rock cap was installed over the entirety of Willow Brook Pond and the open channel of Willow Brook from Willow Brook Pond to Main Street. The exceptions to this approach were the wetland downgradient of the dam, where excavation of PCBs at concentrations greater than 1 ppm was performed, and an area in the southern portion of Willow Brook Pond, where excavation of PCBs at concentrations greater than 1 ppm was performed. The wetland area was backfilled and planted to restore the wetland habitat. The southern portion of Willow Brook Pond was backfilled and capped with the same geotextile, soil and rock cap proposed for the remainder of the pond areas. Following remediation, Willow Brook Pond and the open channel of Willow Brook from the pond to Main Street were restored to the current configuration.

Applications for permits to perform the above activities were issued to the Town of East Hartford Wetlands Commission, The State of Connecticut Department of Environmental Protection, Inland Water Resources Division (DEP IWRD) and the United States Department of the Army, Corps of Engineers (ACOE) among other agencies and commissions. The following permits were issued respectively:

- Town of East Hartford Wetlands Commission Permit issued July 5, 2001.
- DEP IWRD 401 Water Quality Certificate (Permit No WQC-200100497) issued July 20, 2001.
- ACOE Section 404 Permit (Permit No. 20002988) issued July 24, 2001.

Soil remediation activities at the site were initiated on July 24, 2001. The anticipated completion date for the planned activities was December 31, 2001. As a result of expansion of the project scope, the construction activities, site restoration and the establishment of vegetation continued through August 31, 2002.

As a result of the extended construction period, an extension to the ACOE 404 permit will be necessary. Completion of the site restorations and mitigation is herein established as August 31, 2002. As such, and extension to ACOE Permit No. 200002988 from December 31, 2006 to August 31, 2007 will be required.

3. GENERAL DESCRIPTION OF MITIGATION ACTIVITIES

The proposed mitigation activities were presented in a detailed *Mitigation Plan* prepared by Loureiro Engineering Associates, Inc. and revised in February 2002. This document presents a general background of the project, a summary of the proposed soil remediation activities, details of the proposed soil caps and a detailed summary of the proposed site restoration activities as well as the post-remediation monitoring record keeping and reporting activities. In addition, the proposed restoration activities were also detailed in the permit application packages submitted to the Town of East Hartford Wetlands Commission and the DEP IWRD.

These documents were used as the basis for performance of all restoration activities completed at the site. In addition, the services of a qualified wetland biologist were retained to assist in specifically managing the hand-on activities and to provide additional direction to further enhance the outcome of the restoration project.

The following presentation documents the specific activities associated with the site restoration activities. Additional documentation will be provided in the annual monitoring reports.

3.1 Wetland Peat/Muck

Upon completion of the remedial activities within the wetland area, the marsh was reconstructed by the deposition of organic enriched soil. Clean leaf compost, which was composted for a minimum of one year, was used as a soil amendment. This soil material was processed on site by mixing the composted leaf mulch with clean sand. Several tests were performed on the leaf compost prior to processing to ensure that weed growth would be minimized. Laboratory analytical data representing the subject material along with a memorandum summarizing the analyses performed and the related suitability for use in the marsh construction are included in Attachment No. 1.

During the application of the organic rich soil to the marsh area, the surface was purposely and irregularly interrupted to create a natural hummocky finished surface. Low-pressure track mounted heavy equipment was used to minimize compaction of the organic material. The final product varied in elevation by up to one foot with sharp and soft hills and valleys throughout. At the approximate center point of the marsh, a 30-foot by 30-foot by three foot deep (from average adjacent grade) turtle pond was constructed. Coarse woody debris was selected from wooded areas of the site for installation throughout the marsh area. This material was strategically selected to include material in varying stages of decomposition. Branches were used to provide

surface and subsurface structure throughout. In final, the estimated coverage on the marsh with coarse woody debris is approximately 2%.

3.2 Streambed Restoration

Upon completion of the remedial activities and cap construction within the channel sections of the site, the channel was restored with clean gravel from a stratified drift deposit imported from an off-site source. The select material contained a fine distribution of coarse sand up to cobble size materials all well worn with rounded corners and a smooth finish. This material selection was critical in replicating the material typically observed in a well-flushed brook or steam. Boulders (flow deflectors) were strategically scattered throughout the streambed to provide eddy pools and channel riffles as well as in-steam cover for fish.

In response to comments from the Inland Water Resources Division, a K-dam was installed at a pre-selected location within the streambed with the intention of impounding water within the marsh. The location and configuration of the K-Dam were approved through issuance of the 401 permit. This feature is described in greater detail in the following sections.

3.3 Coir Fiber Logs (Biologs®)

Biologs® were installed around the perimeter of the wetland area at the intersection of the water surface and the embankment as shown on the As-Built Drawings. These structures were installed with the intent of retaining the lower section of the embankment and providing a stable intersection between the normal water level and the embankment.

The Biologs® were installed with approximately 50% of each log below the normal water level and 50% of each log exposed above the water level. Wetland emergent plants (2-inch plugs) were installed at regular intervals throughout and immediately behind the Biologs® to stabilize the biodegradable structures.

As per the recommendation of the wetland biologist, additional Biologs® were installed along the northern limit of the stream channel alongside the wetland marsh as shown on the As-Built Drawings. This installation was intended to divorce the relatively steady velocity of the stream channel section from the quiescent nature of the marsh area. Interstitial breaks in this row were strategically located throughout the run to provide for limited ebb and flow through the marsh.

3.4 Emergent Marsh Plantings

Upon stabilization of the marsh area, the stream channel K-Dam was installed to impound the water within the marsh. This dam effectively established a normal water level of 20.2 within the

marsh, providing water depths of one-half to one foot in the marsh and about four feet of depth in the turtle pond. The area was completely flooded then assessed by the emergent plant purveyor from Blackledge River Nursery in Marlborough, Connecticut. Plant species and quantities were carefully selected to satisfy the bathymetry created within the marsh area and for planting within and immediately behind the Biologs®.

Emergent plants were installed with the thoroughly flooded marsh to ensure the proper water depth was provided for the select species. In total, 2,400 herbaceous wetland plants were provided within the marsh. 500 of these plants were installed around the perimeter of the marsh within and/or immediately behind the Biolog®. In addition, some wetland seeds were dispersed within shallow flooded areas to augment the emergent plants established throughout.

The emergent marsh was planted with the following emergent plants:

Species

Soft-stem Bulrush (Scirpus validus)
Arrow-Arum (Peltandra virginica)
Pickerelweed (Pontederia cordata)
Branching Bur-Reed (Sparganium androcladum)
Giant Bur-Reed (Sparganium eurycarpum)

The emergent marsh was planted with the following wetland seeds:

Species

Broad-leaved Arrowhead (Sagittaria Latifolia)
Water Plantain (Alisma plantago-aquatica)

The Biologs® were planted with the following emergent plants:

Species

Tussock Sedge (Carex stricta)
Soft Rush (Juncus effuses)
Wool Sedge (Scirpus cyperinus)

3.5 Embankment Plantings

The proposed plantings were generally presented in the above referenced drawings and documents. Specific seed mixtures and shrub selections were not specified to allow for

flexibility in the restoration activities, as many of these wildlife species are not always readily available. The following paragraphs detail the specific species selected and generally discuss the placement of these various floras throughout the project.

3.5.1 Seed Mixtures

The following seed mixtures were installed on the pond, stream and wetland slopes and non-lawn areas at the site.

New England Wetmix

The New England Wetmix was hand sown, to form a 3-foot strip along the waterline for the emergent marsh within the wetland area as shown on the As-Built Drawings. The seed mix was then lightly raked to ensure proper soil-seed contact. A light mulch of clean, weed-free straw was then installed to conserve moisture.

The New England wetland seed mix contains a wide variety of native seeds, which are suitable for most wetland mitigation, and restoration sites, which are not permanently inundated. All species are best suited to moist disturbed ground as found in most wet meadow, scrub shrub, or forested wetland mitigation and restoration areas. This mix is not generally under standing water. During the first season of growth, several species should produce seeds, while other species will produce seeds after the second growing season. This mix is composed of the wetland species most likely to grow in created/restored wetlands, and should produce more than 75% ground cover in two full growing seasons. Based on initial visual observations of this seeded strip, good germination of select species was present. The seed mixture consists of the following:

Species

Fox Sedge (Carex vulpinoidea)
Hop Sedge (Carex lupulina)
Water Plantain (Alisma plantago-aquatica)
Nodding Bur-marigold (Bidens cernua)
Lurid Sedge (Carex lurida)
Soft Rush (Juncus effusus)
Grass-leaved Goldenrod (Solidago graminifolia)
Bearded Sedge (Carex comosa)
Fringed Sedge (Carex crinita)
Boneset (Eupatorium perfoliatum)
Flat-top Aster (Aster umbellatus)

Hard-stem Bulrush (Scirpus acutus)
Green Bulrush (Scirpus atrovirens)
Woolgrass (Scirpus cyperinus)
Spotted Joe-pye Weed (Eupatorium maculatum)
Blue Vervain (Verbana hastata)
Ditch Stonecrop (Penthorum sedoides)

New England Erosion Control/Restoration Mix

The New England Erosion Control/Restoration Mix was applied by hydroseeding to form a 5-foot strip along the ponds and the brook above the riprap engineered control as shown on the As-Built Drawings. A light mulching of weed free straw was installed to conserve moisture. Fertilization was not required because the soils were not particularly infertile.

The New England Erosion Control/Restoration Mix contains a selection of native grasses and wildflowers designed to colonize generally moist, recently disturbed sites where quick growth of vegetation is desired to stabilize the soil surface. The plants in this mix can tolerate infrequent inundation, but not constant flooding. Based on initial visual observations of this seeded strip, good germination of select species was present. The seed mixture consists of the following:

Species

Switchgrass (Panicum virgatum)
Virginia Wild Rye (Elymus virginicus)
Creeping Red Fescue (Festuca rubra)
Fox Sedge (Carex vulpinoidea)
Creeping Bentgrass (Agrostis stolonifera)
Silky Wild Rye (Elymus villosus)
Partridge Pea (Chamaecrista fasciculata)
Soft Rush (Juncus effusus)
Flat-top Aster (Aster umbellatus)
Nodding Bur-marigold (Bidens cernua)
Joe-pye Weed (Eupatorium maculatum)
Boneset (Eupatorium perfoliatum)
Grass-leaved Goldenrod (Solidago graminifolia)
Grey Goldenrod (Solidago nemoralis).

New England Conservation/Wildlife Mix

The New England Conservation/Wildlife Mix was applied by hydroseeding to the remaining upper slopes along the ponds and brook as shown on the As-Built Drawings.

The New England Conservation/Wildlife Mix provides a permanent cover of grasses, forbs, wildflowers and legumes to provide both erosion control, and wildlife habitat value. This mix is designed to produce a no-maintenance cover, and is an appropriate application for cut and fill slopes, detention basins, and disturbed areas adjacent to commercial and residential projects. Based on initial visual observations of these seeded areas, good germination of select species was present. Some weeds were initially present primarily along the southern facing slopes. The weeds observed were harvested to facilitate growth of the select species. The seed mixture consists of the following:

Species

Big Bluestem (Andropogon gerardii)
Little Bluestem (Schizachyrium scoparium)
Switchgrass (Panicum virgatum)
Fox Sedge (Carex vulpinoidea)
Silky Wild Rye (Elymus villosus)
Common Milkweed (Asclepias syriaca)
Deertongue (Panicum clandestinum)
Pennsylvania Smartweed (Polygonum pensylvanicum)
Silky Smooth Aster (Aster laevis)
Nodding Bur-marigold (Bidens cernua)
Flat-top Aster (Aster umbellatus).

3.5.2 Shrubs and Trees

A diverse mixture of upland, wetland, and upland/wetland shrubs and trees were installed in the wetland and throughout the site in accordance with the site restoration plans as shown on the As-Built Drawings. The woody stock was intentionally installed with diverse species selections and placement throughout the planting communities. Wetland shrubs were installed at appropriate elevations, as were the upland species as determined by the wetland biologist. Based on initial visual observations of the woody stock communities, some transplant shock was observed throughout the site. Fertilization and trimming of the impacted plants has been performed. Further assessment will be made during the first semi-annual monitoring event. The woody stock species planted at the site include the following:

Wetland Species

Silky Dogwood (Cornus Amonum)
Shadblow (Amelancher Canadensis)
Pussy Willow (Salix Discolor)

Upland Species

Gray Dogwood (Cornus Racemosa)
Bayberry (Myrica Pensylvanica)

Upland/Wetland Species

Winterberry (Ilex Verticillata)
Elderberry (Sambucus Canadensis)
Black Gum (Nyssa Sylvatica)
Green Ash (Fraxinus Pensylvanica)

4. MAINTENANCE AND MONITORING

The future maintenance, monitoring and record keeping/reporting activities are specifically detailed in the *Mitigation Plan* prepared by Loureiro Engineering Associates, Inc., revised in February 2002. At this juncture, Environmental Planning Services of West Hartford, Connecticut has been retained to assist in the post mitigation monitoring activities. In general, the mitigation monitoring will extend for the first three full growing seasons. During this monitoring period, remedial actions may be necessary as directed by the biologist/wetland scientist, and could include, but are not limited to, replacement and/or substitution of plant materials, regrading, and nuisance vegetation removal. A final post construction assessment will be prepared five years after construction was completed (August 31, 2007).

Attachment No. 1

Wetland Muck/Peat Documentation

Loureiro Engineering Associates, Inc.

Interoffice Memo

Date: March 7, 2002
To: Brian Cutler, P.E., L.E.P.
From: George F. Andrews Jr., P.E.
Subject: Organic Material for Wetland Restoration, Willow Brook/Willow Pond, E.H., CT

I have prepared herein a summary of information related to the proposed organic material for the wetland restoration efforts at the above referenced project site. The related documentation is attached for your reference.

The proposed material will be provided by GreenCycle of the Northeast. GreenCycle compost is derived from decomposed leaves and yard trimmings and is 100% natural. No sewage sludge, other biosolids, or municipal solid waste are added. The material selected is finished compost and does not include and mineral adders (other than the minimal amount of sand derived from the pad during the loading activities).

Previously submitted laboratory data representing this material is included as Attachment 1. In general:

Organic content varied from 22 to 34 % with an average of 27%
Solids ranged from 44 to 52% with an average of 49%
C:N ratio ranged from 16 to 23 with an average of 19
PH ranged from 6.8 to 7.7 with an average of 7.25

The weed seed test performed by GreenCycle indicated no germination in 14-days.

In accordance with Michael Klein's direction, GreenCycle ordered another weed germination test through the Connecticut Agriculture Experiment Station. The results of two assessments are included in Attachment 2. The outcome from the first test indicated no germination of weed with a tiny amount of moss under standard greenhouse conditions. The second test was performed after an extended freeze period to simulate winter. No weed or moss germination was noted in the second test.

Mr. Klein indicated that the C:N ratio reported "was a little high." However, this condition could be corrected by adding additional nitrogen during the deposition activities.

Attachment 1
Laboratory Data

Servi-Tech Laboratories
1816 E. Wyatt Earp • P.O. Box 1397 • Dodge City, Kansas 67801
Phone: 316-227-7123 • FAX: 316-227-2047

LABORATORY ANALYSIS REPORT

GREENCYCLE OF THE NORTHEAST	892
CHRIS FIELD	D49263
25 BRIXTON STREET	07/16/01
WEST HARTFORD, CT 06110	07/17/01

Results For:

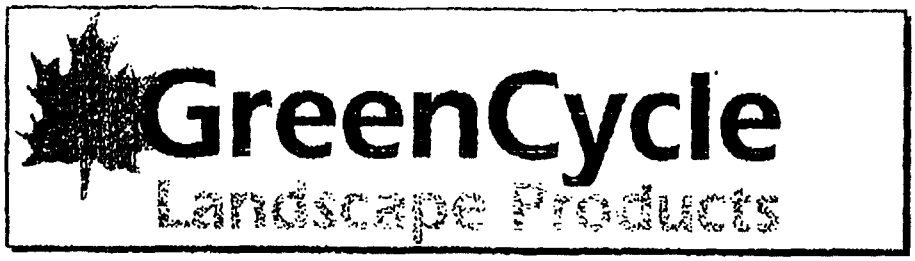
Analysis Description: COMPOST

Sample Identification:

		Analysis (As Recd)	Lb/Ton (lb/ton)
NITROGEN:			
AMMONIUM-N,	% N	0.00	0.02
MAJOR & SECONDARY NUTRIENTS:			
POTASSIUM,	% K2O	0.14	2.89
MAGNESIUM,	% MgO	0.26	5.23
SODIUM,	% Na	0.007	0.16
MICRONUTRIENTS:			
IRON,	ppm Fe	3,863	7.73
COPPER,	ppm Cu	13	0.03
MOISTURE,	%	60.3	
ORGANIC MATTER,	%	16.7	333.33
CARBON : NITROGEN		18	
pH		7.3	

organic nitrogen are considered available during the growing season follow-
incorporated shortly, about 1/4 to 1/3 of the urea and ammonium nitrogen

soil type, crop grown, and (if irrigated) the water quality. Contact the



Material Test Summary

Material	Compost	Compost	Compost	
Source	West Hartford	Ellington	West Hartford	Compost Average Value
Test Lab	Woods End	Servi-Tech	Servi-Tech	
Sample Date	3/9/98	3/16/98	3/16/98	
Total N	0.82%	0.85%	0.68%	0.78%
Organic N	0.81%	0.83%	0.39%	0.67%
Phosphorous (P)	0.12%	0.33%	0.19%	0.21%
Potassium (K)	0.14%	0.28%	0.15%	0.19%
pH	7.25	6.8	7.7	7.25
Organic Matter	34.60%	24.80%	22.78%	27.39%
C:N Ratio	22.8	16	19	19.27
Conductivity	0.5	1.21	0.79	0.83
Solids	44.0%	50.8%	51.8%	48.87%
Moisture	56.0%	49.2%	48.2%	51.13%
Weed Seed Test	Zero Germination in 14 days			
Wheat Grass Germination	100%		Rated Non-toxic	
Wheat Plant Weight	100%		Rated Excellent	
Cress Germination	98%		Rated Non-toxic	
Cress Plant Weight	91%		Rated Excellent	

GreenCycle compost is derived from decomposed leaves and yard trimmings and is 100% natural. It contains absolutely no sewage sludge (biosolids) or other municipal solid waste and is safe to use in food production.

GreenCycle of the Northeast • 25 Brixton Street • West Hartford, CT 06110
(860) 953-7799 • Fax (860) 953-7749

Attachment 2
Weed Germination Test Data

The Connecticut Agricultural Experiment Station

VALLEY LABORATORY COOK HILL ROAD BOX 248 WINDSOR, CONN. 06095

Founded 1875 *Putting science to work for society*

December 10, 2001

Neil Hickey
Loureiro Engineering Associates
100 Northwest Drive
Plainville, CT 06062

Dear Mr. Hickey,

In response to your request earlier today, I am writing to inform you of my analysis of composted leaf material provided to me in early November by J. Christopher Field of GreenCycle of the Northeast, Inc. in West Hartford. Chris asked me to check the compost for the presence of weed seeds. Because isolating weed seeds from such a complex mixture is a very difficult challenge, I decided to check for weed emergence by exposing the compost to conditions favorable for seed germination.

On November 7, I filled two greenhouse flats (18" x 13") with the compost sample. One flat has been kept in our greenhouse in which nighttime temperatures during this period ranged from 50 to 55° F, and daytime temperatures ranged from 65 to 80° F. The compost has been kept moist with daily irrigation from an automatic sprinkler system. As of today (more than 1 month later), no weed seedlings, except for a tiny amount of moss, have emerged from the compost in the greenhouse. The other flat was kept in a growth chamber set at 72° F day / 60° F night with 12 hr of light / 12 hr of dark for 3 weeks. The compost was kept moist with daily watering. No weeds or moss have emerged from the compost in the growth chamber.

There is a possibility that the compost may contain dormant weed seeds that require an extended cold period (i.e. winter) to stimulate subsequent germination. Thus, I placed the remainder of the compost sample in a freezer until February, at which time I will let the sample thaw and then check again for weed seedling emergence in the greenhouse and growth chamber.

Sincerely,

Todd L. Mervosh, Ph.D.
Weed Scientist

cc: J. Christopher Field

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION

TODD L. MERVOSH, Ph.D.
WEED SCIENTIST

153 COOK HILL ROAD
P.O. BOX 248
WINDSOR, CT 06095
TEL: (860) 683-4
FAX: (860) 683-4
E-MAIL: Tmervosh@caes.state.ct.us

Rec'd via e-mail 3/7/02 DTM

March 6, 2002

Neil Hickey
Loureiro Engineering Associates
100 Northwest Drive
Plainville, CT 06062

Dear Mr. Hickey,

I am writing to update you regarding my analysis of composted leaf material provided to me in early November 2001 by J. Christopher Field of GreenCycle of the Northeast, Inc. in West Hartford. As requested, I have monitored the compost for the emergence of weed seedlings.

On November 7, I filled two greenhouse flats (18" x 13") with the compost sample. One flat has been kept in our greenhouse in which nighttime temperatures have ranged from 50 to 55° F, and daytime temperatures ranged from 60 to 80° F. The compost has been kept moist with daily irrigation from an automatic sprinkler system and supplemental watering as needed. A second flat was kept in a growth chamber set at 72° F day / 60° F night with 12 hr of light / 12 hr of dark for 3 weeks. The compost was kept moist with daily watering. Except for significant moss growth on the compost kept over winter in the greenhouse, no weeds emerged in either flat.

As I mentioned to you in my letter dated December 10, 2001, I placed the remaining compost in the freezer on November 7 to simulate an extended winter period that increases subsequent germination of some weed seeds. On February 14, I removed this compost from the freezer and spread it out in a greenhouse flat. For the last 3 weeks, it has been subject to greenhouse conditions as described above. Thus far, no weeds or moss have emerged from the compost.

Sincerely,

Todd L. Mervosh, Ph.D.
Weed Scientist

cc: J. Christopher Field

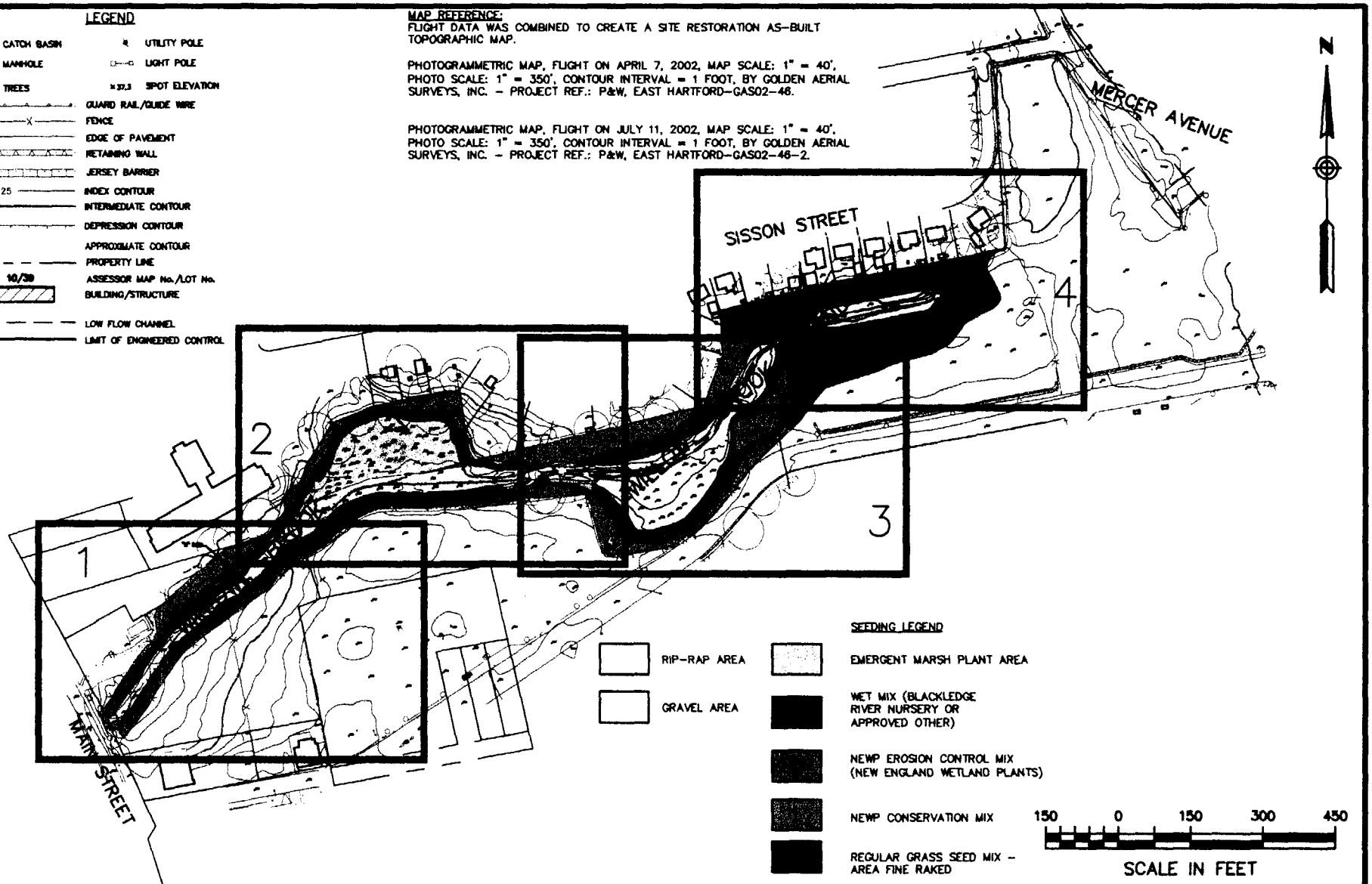
LEGEND

CB CB CATCH BASIN
UTILITY POLE
MANHOLE
LIGHT POLE
TREES
x 37.3 SPOT ELEVATION
GUARD RAIL/GUIDE WIRE
FENCE
EDGE OF PAVEMENT
RETAINING WALL
JERSEY BARRIER
25 INDEX CONTOUR
INTERMEDIATE CONTOUR
DEPRESSION CONTOUR
APPROXIMATE CONTOUR
PROPERTY LINE
10/38 ASSESSOR MAP No./LOT No.
BUILDING/STRUCTURE
LOW FLOW CHANNEL
LIMIT OF ENGINEERED CONTROL

MAP REFERENCE:
FLIGHT DATA WAS COMBINED TO CREATE A SITE RESTORATION AS-BUILT TOPOGRAPHIC MAP.

PHOTOGRAMMETRIC MAP, FLIGHT ON APRIL 7, 2002, MAP SCALE: 1" = 40', PHOTO SCALE: 1" = 350', CONTOUR INTERVAL = 1 FOOT, BY GOLDEN AERIAL SURVEYS, INC. - PROJECT REF.: P&W, EAST HARTFORD-GAS02-46.

PHOTOGRAMMETRIC MAP, FLIGHT ON JULY 11, 2002, MAP SCALE: 1" = 40', PHOTO SCALE: 1" = 350', CONTOUR INTERVAL = 1 FOOT, BY GOLDEN AERIAL SURVEYS, INC. - PROJECT REF.: P&W, EAST HARTFORD-GAS02-46-2.



Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

AS-BUILT
OVERALL SHEET LAYOUT

SEPT. 4, 2002

Loureiro Engineering Associates, Inc.
100 Northwest Drive, Plainville, Conn. 06062
An Employee Owned Company 860-747-6181

Purpose: As-Built Documentation
WILLOW BROOK/WILLOW BROOK POND
MAIN STREET, EAST HARTFORD, HARTFORD COUNTY, CONNECTICUT

AB 1 of 5

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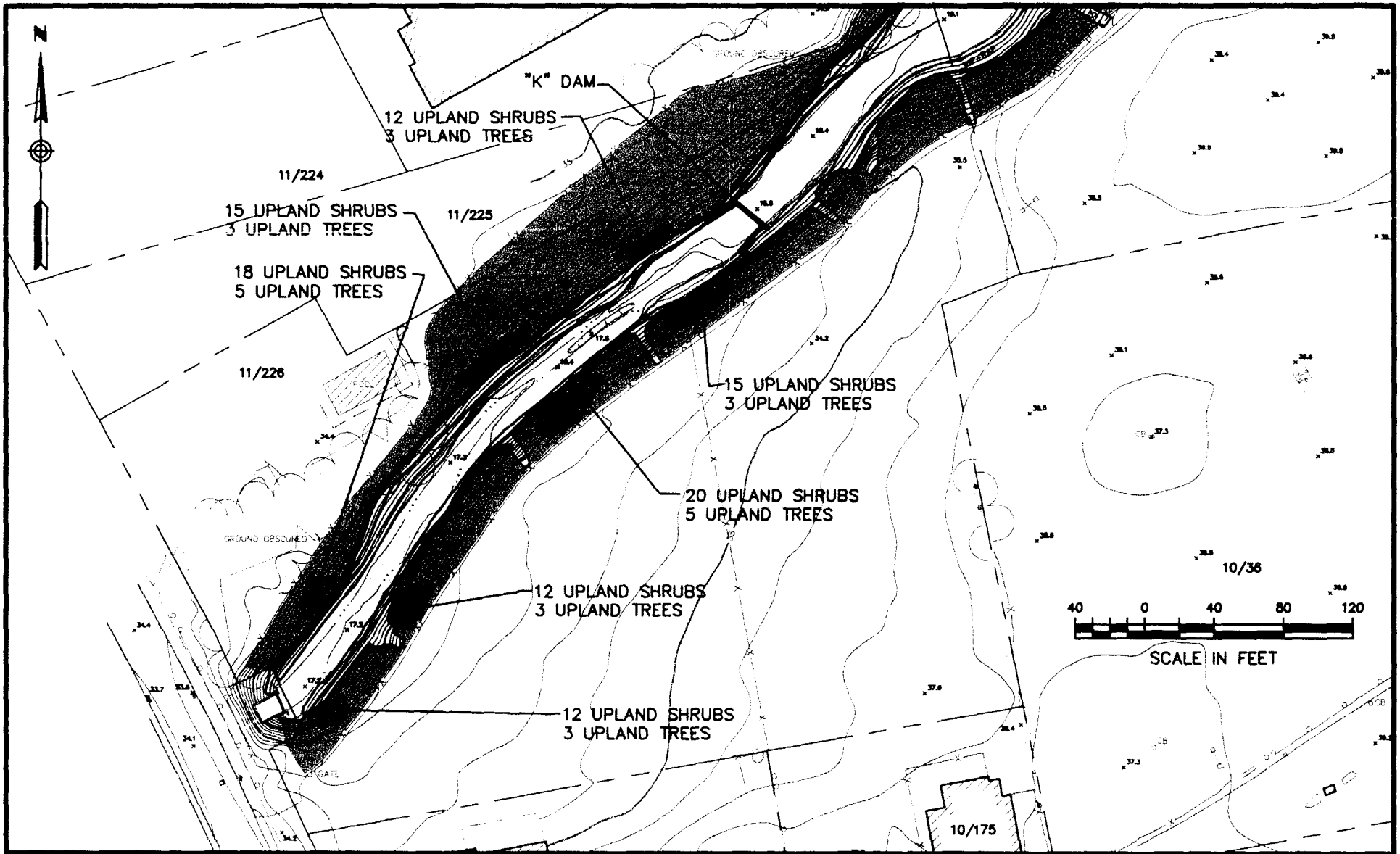

Application by:
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY

AS-BUILT
SHEET 1

SEPT. 4, 2002

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An Employee Owned Company 860-747-6181

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MAIN STREET, EAST HARTFORD, HARTFORD COUNTY, CONNECTICUT

AB 2 of 5

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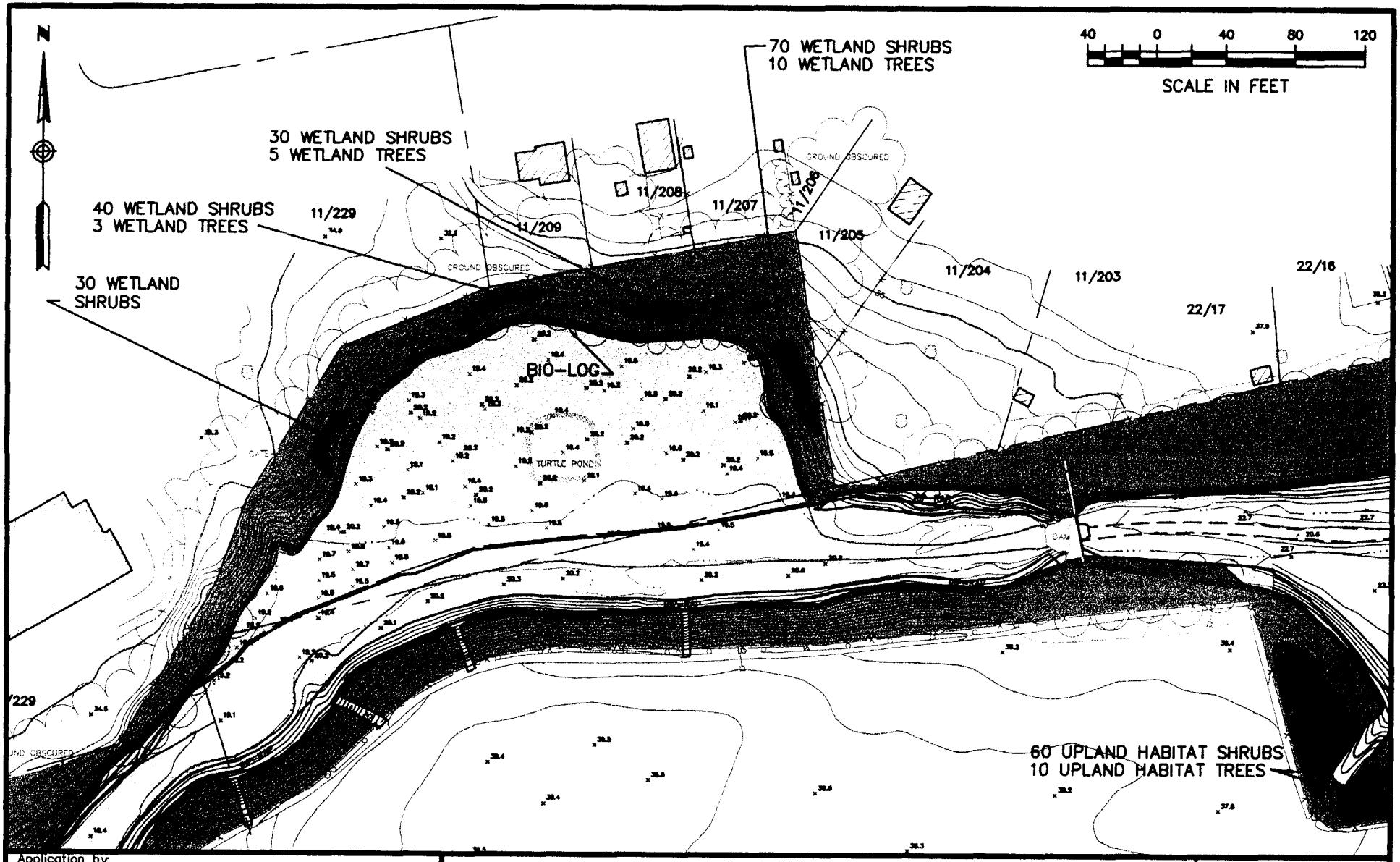

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MAIN STREET, EAST HARTFORD, HARTFORD COUNTY, CONNECTICUT

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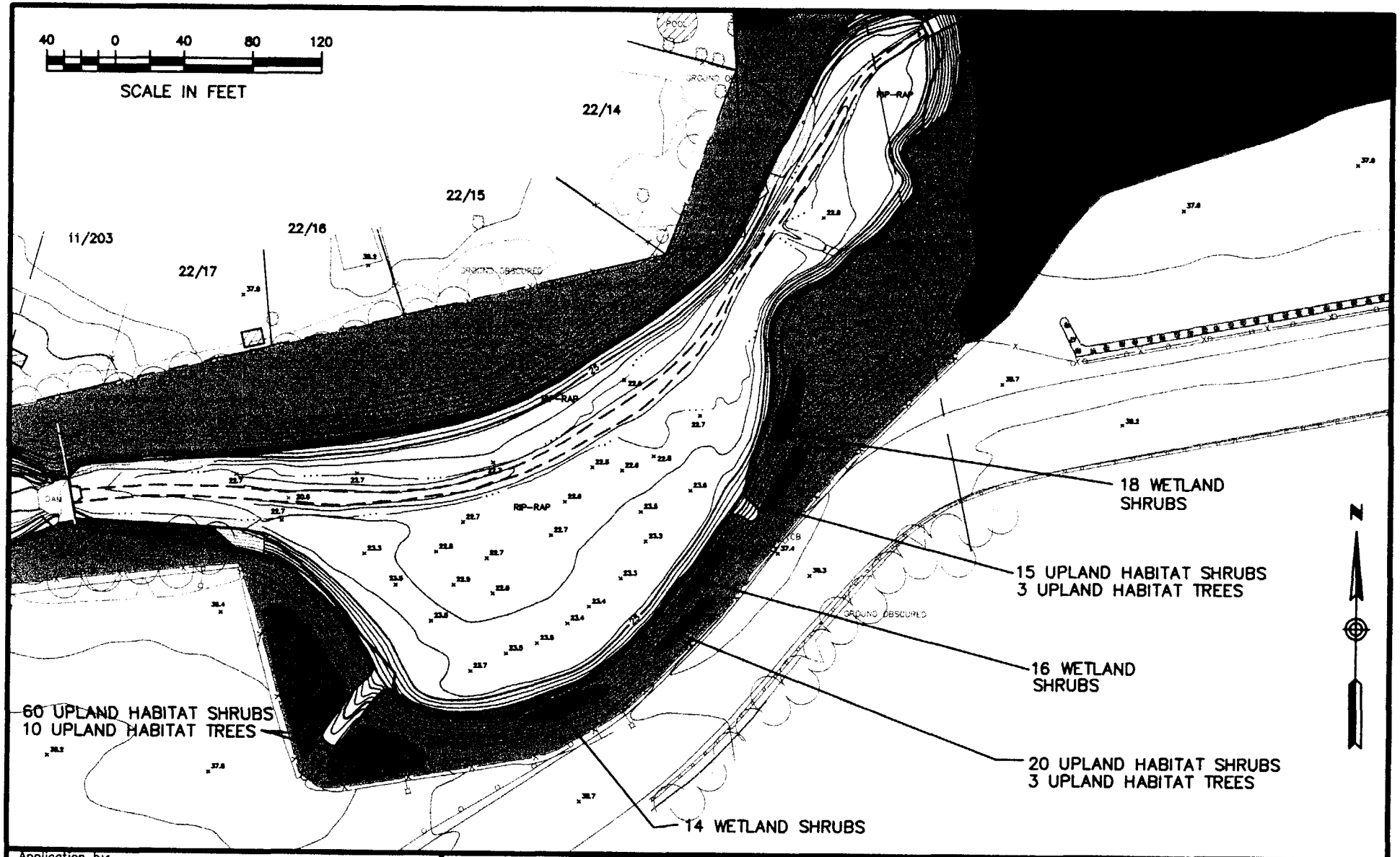

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AS-BUILT
SHEET 3

SEPT. 4, 2002

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WILLOW BROOK/WILLOW BROOK POND
MAIN STREET, EAST HARTFORD, HARTFORD COUNTY, CONNECTICUT

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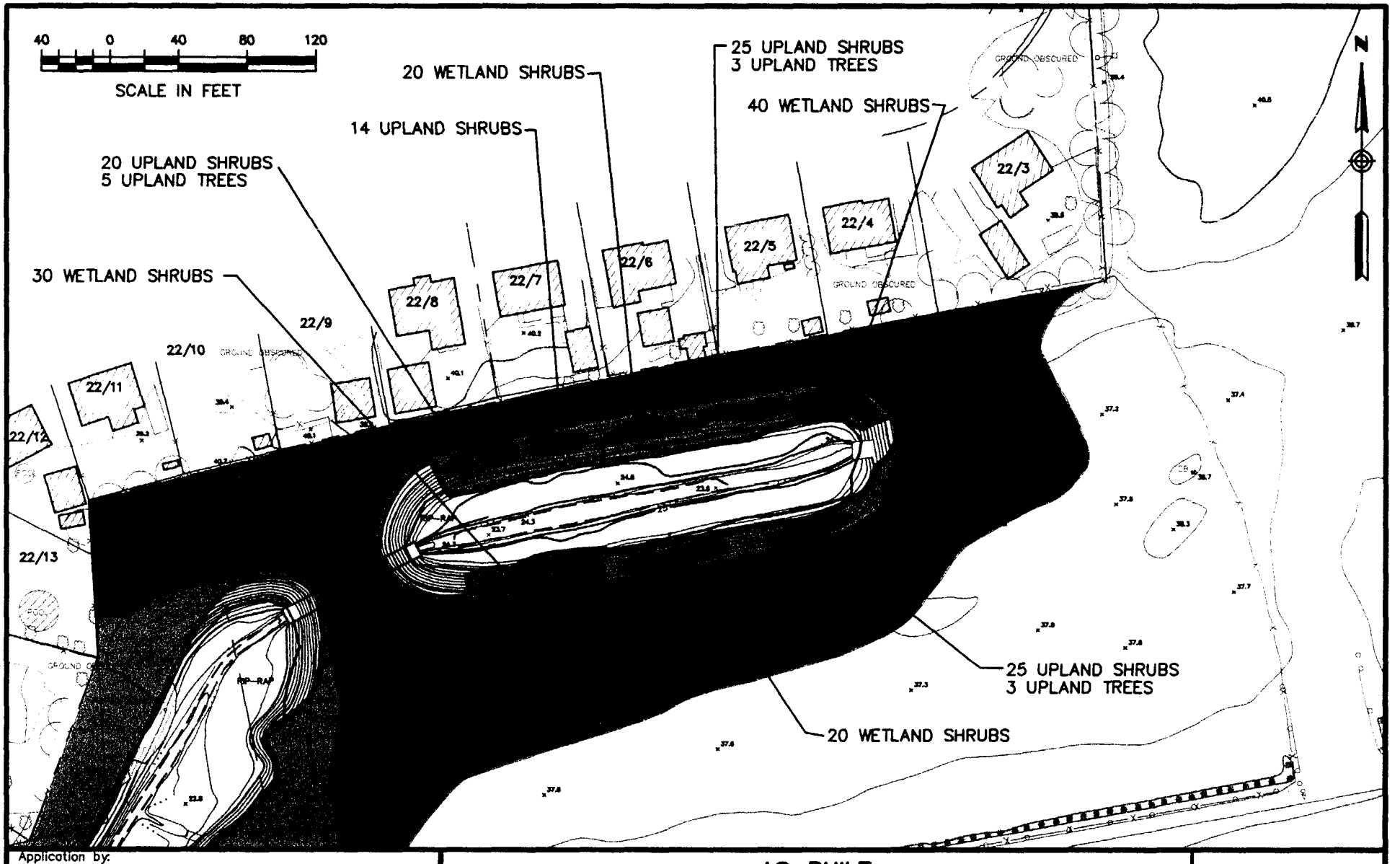

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AS-BUILT
SHEET 4

SEPT. 4, 2002

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Purpose: As-Built Documentation
WILLOW BROOK/WILLOW BROOK POND
MAIN STREET, EAST HARTFORD, HARTFORD COUNTY, CONNECTICUT

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